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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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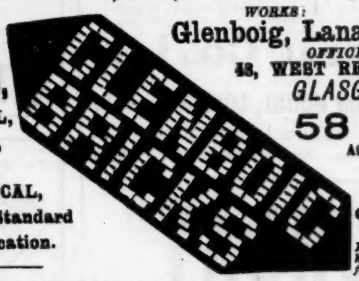

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CL., No. 2980.] TUESDAY, JUNE 22, 1920. [72ND YEAR.

EDITORIAL NOTES.

Preparing to Amend the Gas Regulation Bill.

IT is expected that Standing Committee A will commence consideration of the Gas Regulation Bill this week—probably to-day. A preliminary to this is that last Thursday and Friday notices were given of amendments to the measure which, numerically great, occupy several closely printed foolscap pages of the parliamentary papers. The bulk of these amendments stand in the name of Mr. Bridgeman, the Parliamentary Secretary to the Board of Trade. Major Hills has also a good showing, including some new clauses affecting pressures to railway premises and other matters; Col. Roundell has a few amendments, which show an excellent intention towards the gas industry; Sir Ryland Adkins has entered his name for a number, but their nature has not yet been disclosed; and Sir William Raeburn has named several. It is clear that the modifying proposals emanating from the gas industry will be largely in the hands of Mr. Grattan Doyle.

Many of the proposed alterations are purely verbal or structural ones, and do not materially alter the position. Col. Roundell wants to ensure that, in fixing the price per therm, and providing in the price for such additions to increased costs as may be necessary to meet unavoidable increases in expenditure, the pre-war authorized dividends shall continue to be paid. Whether this means that they shall be constituted minima, is not clear; but it looks like the intention. Mr. Bridgeman also contemplates making it plain in the revised clause that the "cost of production "and supply" means "cost and charges incidental to" production and supply. Col. Roundell is proposing the excision of the long sub-section 4 of clause 1. What this means will be seen from the text of the Bill as published by us on May 25. We anticipate there will be resistance to this on the part of the Board of Trade, though certain proposals should anyway be modified. Supposing the sub-section stands, Mr. Grattan Doyle will ask, in the part where alteration, adjustment, and replacing of consumers' appliances are provided for, that the words be added "except "in the case of any consumer who objects to such altera-"tion, adjustment, or replacement by the undertakers." The descriptive term "gross" is to be applied to British thermal units; and power will be sought to enable gas undertakers to declare different calorific values to be applicable to different parts of their limits of supply. As to inerts, Mr. Grattan Doyle will ask for the complete elimination of paragraph iii. of clause 2, and of sub-section 3 of the same clause. Where in clause 2 it is provided that the stipulations as to sulphuretted hydrogen, pressure, and incombustible materials shall not apply to gas used for industrial purposes only, it is now proposed by Major Hills that the word "power" shall be inserted before "gas," so that the exemption shall not apply to the ordinary gas. Why the need for distinction, so long as the gas is used for industrial purposes, we fail to see. An attempt is going to be made to delete clause 3, which makes it illegal for any person to charge for the supply of gas according to the number of B.Th.U. supplied, unless authorized to do so under this Act or a Special Act of Parliament.

Another amendment contemplates making it obligatory upon local authorities (unless they are themselves the gas undertakers) to appoint a gas examiner; and Mr. Grattan Doyle is going to submit a new series of provisions defining the powers and duties of examiners. The Bill proposes that the Gas Referees "may" prescribe apparatus, &c. Major Hills is of opinion that "shall" will better meet the case. As sub-section 2 of clause 5 now stands, it provides that the prescribed apparatus shall, "in the case of any "undertakers who have manufactured in the preceding "year more than 100 million cubic feet of gas, and in "any other case in which it appears necessary to the Gas "Referees," include a recording calorimeter. The Board of Trade propose to convert the word "manufactured" to "sold;" while Major Hills desires to delete the words quoted, so as to compel all undertakings coming under the Act to provide a recording instrument. The insertion of words will be sought to ensure that the apparatus used is the most suitable for ascertaining the total heat value of the gas. It will be remembered that it is proposed that the expenditure under the Act during the first two years shall be provided by Parliament, but is to be repaid out of the Gas Fund with interest. It is now suggested that the repayment of the two years' expenses shall be within three years. A point in connection with contributions to the Gas Fund that we formerly made was that the word "manufactured" should be altered to "sold." Sir William Raeburn is to make the proposal.

The complete removal of sub-section 1 of clause 9, dealing with forfeitures for deficiencies, will be sought by Colonel Roundell; and other proposals will be made for a reduction of the amounts of the penalties. In this connection we formerly strongly objected to sub-section 4 of the same clause, which contemplates enacting that in the case of companies, when the calorific power is in any quarter less than the declared value, a sum representing the amount by which the revenue had been improperly increased should be deducted from the "divisible profits, and the dividend which "the undertakers may pay on their original capital shall be "correspondingly reduced." We do not think a deduction from the dividend would be at all fair to the stock or share holders. The Board of Trade suggest as an amendment (which will not meet the objection) to leave out the words "divisible profits," and insert "amount applicable to the "payment of dividend on the ordinary capital of the under-"takers for the year or half year in which such quarter "occurs, and carried forward to the credit of the revenue "account for the next following year or half year, in addi-"tion to any other amount which would otherwise have "been so carried forward." After the word "capital," it is also proposed to insert "in respect of such first mentioned "year or half year." Mr. Grattan Doyle will propose the complete omission of sub-section 4 of clause 9, which, if successful, would cancel the foregoing amendments. Also in connection with forfeitures, Colonel Roundell proposes that it shall be provided "that, in view of the present and "probable future difficulties of coal supplies and qualities, "the Board of Trade shall have power to modify and revise "testing conditions and penalties." This would be a serviceable provision.

The question as to whether the Act will apply to non-statutory undertakings is set at rest by the intention of the Board of Trade to incorporate as the definition of "gas "undertakers" "any local authority, company, body, or "person authorized to supply gas by any Act of Parlia-"ment, or any Order having the force of an Act of Parlia-"ment." It is, we also see, the intention of Sir Joynson Hicks to submit a clause making it compulsory on the part of undertakings coming under the Act to extract benzol and such other bye-products as may be essential in the public interest.

The railway companies are proposing to busy themselves in three particulars; and we have no doubt they will object to the deletion or modification of the inerts clauses. They want to ensure not only that there shall be a pressure of

20-10ths in all pipes of 2 in. diameter and upwards, but that this pressure shall be maintained at the inlet of all primary meters on railway premises—presumably irrespective of the size of the pipes. They desire, too, that the 20-10ths pressure shall apply to 500 B.Th.U. gas, and that an increased pressure shall be provided when the calorific value is below 500 B.Th.U. To ensure this, they propose that the pressure shall then "be so increased that the product of the multipli- "cation of the number of thermal units by the number of "tenths of an inch of pressure as so increased shall at no "time be less than 10,000." For example, 400 B.Th.U. gas would require 25-10ths pressure at the primary meters to comply with this prescription—that is to say, 400 × 25 = 10,000. We rather think some modification will be sought, on behalf of the gas industry, in this preferential provision. Then it is asked that any gas examiner appointed under the Act may and shall, at the request of the railway company concerned, test the pressure at which the gas is supplied, and the gas suppliers are (so it is suggested) to afford all reasonable facilities for making the tests. The railway companies are also hoping to obtain the insertion of this provision: "Any alteration, adjustment, or replace- "ment of the burners, pipes, and appliances of a railway "company that may be necessary in consequence of the "declared calorific value differing from the calorific value "of the gas as authorized at the date of the Order under this "Act, or in consequence of any subsequent alteration in "the declared calorific value, may be made by the railway "company, and the undertakers shall repay to the railway "company the reasonable costs of such alteration, adjust- "ment, or replacement." This is very interesting. The only reason for an alteration of the declared calorific value will be more economical gas production; and whatever benefits result from this will be shared by the railway companies jointly with the other gas consumers. The railway companies not only want the benefit of any lower price per therm, but they wish to compel the gas suppliers to bear the cost the railway companies may be put to in adapting their consuming appliances. In the clause there is an unknown quantity, of which gas undertakings must beware Moreover, the railway companies propose to do the work themselves of making alterations, adjustments, or replacements. They are not entertaining any idea of giving the gas suppliers the opportunity of executing the work with their own staffs, which might result in a saving to the gas suppliers.

There is evidently going to be a good deal of discussion in Committee over the Gas Regulation Bill; and there will have to be, and there will be, on behalf of the gas industry, a close watch upon, and some resistance and some support over, the mass of amendments to be proposed from or by outside quarters.

The Debate with the Electricals.

THE debate took place last Wednesday with the Institution of Electrical Engineers over the case put forward by Sir Dugald Clerk, Prof. Arthur Smithells, and Prof. John W. Cobb, regarding the positions of the gas and electricity industries in relation to coal conservation; and the speeches are reported in this issue. The position is unaltered. The President of the Institution of Electrical Engineers (Mr. Roger T. Smith, one of whose first professional engagements was with the Imperial Continental Gas Association in constructing plant for one of their electrical undertakings), and all the electrical speakers could not have been more courteous than they were to their visitors, more expressive of good wishes for not only the success but the expansion of the gas industry, nor more sincere in their acknowledgements of the indispensable part the gas industry takes in the world's affairs. There was much said in all these respects; but what was said as to the actual figures put forward by Sir Dugald Clerk in opening the debate lingered very near the infinitesimal. One of the last things, indeed, that the electrical men who spoke appeared desirous of dealing with were the efficiency data; and this can be well understood in view of the fact that the data are largely calculated from actual performance. Only "fools rush in "where angels fear to tread." As a matter of fact, analyzing the speeches carefully, not much difference is found between the electrical men and the case of the gas industry—this notwithstanding that the electrical men did most of the talking. Sir Dugald opened, Mr. Wordingham followed, and Prof. Cobb succeeded him. Then a whole string of prominent members of the Electrical Institution were called upon by the President; and it was nearing the time for closing the meeting when Prof. Smithells was named. But time was then well advanced; and he contented himself with a few remarks, and a promise to write more. No other gas man really had an opportunity to speak. We do not complain. We are glad to have on record the best that the foremost electrical engineers could put forward on a technical subject which has been so singularly and slovenly handled in the Electrical Press.

There were two things that the electrical speakers very largely forgot. The first is that the subjects for debate were the thermal efficiencies of the generation and use of gas and electricity in relation to coal conservation. The second is that the subject is one of national importance. Nearly all the electrical speakers failed to reach that plane, but one after the other took refuge in the commercial arena. When they got there, they said much of a platitudinal character, and much that represented ancient admissions (and even, in respect of power, practice) on the part of gas undertakings. We will not attempt to adjudicate here between the claims of national economy and industrial expediency. They may be safely left to adjust themselves. The gas industry has never said that the electricity industry has no right to exist on account of its low thermal efficiency; but the Power Sub-Committee of the Coal Conservation Committee hinted at some coming time when much of the coal carbonized at gas-works and consumed for domestic purposes would be transferred to the wasteful utilization of the electricity generating plant—"wasteful" for the major purpose of heating for which coal is used. The gas industry, too, has made abundant recognition of the important place the electricity industry has in the world; but not in the monopolistic sense in relation to light, heat, and power that the Power Sub-Committee's report (in its body and by footnotes) suggested as a possibility. The gas industry was charged by speakers with having made too much of the report, and with having misread it. The allegation cannot, in reality, be sustained when politicians and writers in the Public Press read the report exactly as the gas industry read it. Mr. C. H. Merz, as the Vice-Chairman, and Mr. C. P. Sparks as a member of the Power Sub-Committee, ought to have known what was in the report. They asserted that what the Committee had in mind was power; and from their remarks it was gathered that there was nothing in the body of the report which justified the views of the gas industry as to the Committee entertaining any visions as to an extensive use of electricity for domestic heating.

Let us here examine into this matter, and refresh the memories of two of the authors of the report. In the text is a summary of the matters dealt with. The thirteenth clause says that a national system of electric power supply would facilitate certain things, "and bring within reach of the "community, as a whole, the great benefits of an increase in "the use of electricity for domestic purposes." In clause 34, a money saving is spoken of, which takes no account of certain "additional and important advantages," which include "a possible saving in coal consumption for domestic pur- "poses," and "the great advantages and economies which "would result from the more extended use of electricity in "the household for heating, cooking, and cleaning purposes "in the way of labour-saving devices, reduction of smoke, "increased cleanliness, &c." In a footnote it is stated that "the coal consumption for domestic purposes, *including most* "*of the coal used in gas-works*, would be affected by an im- "provement in the efficiency of production of electricity; "for as the price of electricity fell, so would its use for "lighting, heating, and cooking, already very considerable, "increase in substitution for the direct use of coal and gas "for those purposes." Do these quotations look as though the Committee had only power in mind? The passages quoted did not slip in accidentally. They appear in different parts of the report, and so were deliberately placed there. What Sir Dugald Clerk and Professors Smithells and Cobb have done has been to show that these anticipations of the Committee cannot be realized, except at a deplorable cost in respect of the nation's coal reserves. Never, we should imagine, have passages in a report from a responsible Committee been more misleading; and there is in them, without going further, sufficient justification for the action of the gas industry.

The peg on which our electrical friends hung persistently in the "debate," and with an impressive unanimity, was that thermal efficiency (they did not deny its importance) was not the sole determining factor in choice and use. Who

in the gas industry has ever said it is? Representative men in the gas industry and its Technical Press have made it perfectly clear that they entertain no such foolish idea. They have said time and again in regard to lighting that there are positions and purposes with which gas cannot compete, because for those positions and purposes electricity has superior convenience; but they have never admitted (there may be isolated gas men with a narrow outlook who have done so) that gas lighting is a back number. It is not. Its efficiency is good; its cost of installation and maintenance low compared with electric lighting; and the relatively low intrinsic brilliancy and high quality of the light commendable advantages. Gas has and will retain an enormous field of supply for lighting. As to power, no one in the gas industry disputes that electricity has excellent attractions for detailed drives about a works or factory, and where there is intermittent running of machines. The gas industry itself uses gas for generating electricity, which is distributed to machines that operate intermittently, or have to travel up and down the retort-house. But where there is constant running of a machine, then—both gas and steam being available on gas-works—whichever is more convenient, is, of course, adopted. Manufacturers know that for long-hour and fairly constant loads, gas is more economical than electricity. It is foolish for electricians to say, as was said in the discussion, that all new factories are adopting electricity for power. Gas undertakings must believe the evidence of their own custom and receipts; and the large outputs and sales of gas-engines by the makers cannot be disposed of by words, even coming from the mouth of such an electrical authority as Mr. Merz. Electrical engineers do not—of course, they do not—think much of gas-engines either as prime movers, or as instruments of power in the factory. They are, electrically viewed, unreliable. Electric motors are all that can be desired. The fact that breakdowns do occur through troubles from the generating end to the motor itself, that fuses, starters, switches, rewinding of armatures, and the renewal of brushes are among the matters that require attention and produce discomfort for the users, are not noticed. Electric motors are all that is good; gas-engines all that is bad. But the discussion was intended to refer to the relation of thermal efficiency to coal conservation, and not to the respective difficulties with the appliances utilizing the forms of energy supplied by the two industries. Little was said by our electrical friends as to cooking and heating. They know that heating in any shape or form is their weakest point. But even in heating, the gas industry does not say that for concentrated high temperatures, though expensive, electricity should not be employed. There are special purposes for which it is useful. But for general heating, it is wasteful. Col. Crompton made some remarks, more or less in jocular vein, as to the efficiency of the gas-oven. He put it no higher than 6 p.ct. He did not, however, say specifically how this was calculated. Naturally, any oven put to use below its working capacity will give a lower efficiency than at maximum use; and the running costs will decrease in proportion to the work done the nearer the latter approaches the maximum capacity of the oven. Again, it is all very well to quote a good round sum paid for gas for heating. The amount tells us nothing as to the extent of use. We know of a factory that pays for 500 million c.ft. of gas a year; we know of prepayment consumers who do their lighting and cooking on from 12,000 to 18,000 c.ft. a year, and without the technical knowledge possessed by Colonel Crompton.

However, there was a little criticism of Sir Dugald's figures. Such as there was will be gathered from the report; and Sir Dugald will be dealing with them himself in a written reply. The efficiency of gas production was not attacked. There was complaint that he had taken the average efficiency of electrical generation; so he did for gas. But he had guarded himself against criticism by also quoting the maximum efficiency from electricity stations with enviable loads, which are never likely to obtain all over the country. The idea of one industry trying to scrap the other was ridiculed; and this recalled to mind the statements already cited from the Power Sub-Committee's report. In this connection, it was interesting to hear Mr. Merz talking of electrical engineers encouraging the development of carbonization processes and gas-producers; inasmuch as the more these things are developed, the better for electricity, which will then make its way more and more as a distributing agent. It is cheap B.Th.U. that electrical engineers want; and it matters little to them from which direction they come. The Board of Fuel Research are desirous that the gas industry shall become the centre of fuel distribution by developing, from the materials resulting from coal carbonization, water gas as an industrial heating agent, and producer gas for power purposes. Developments naturally cannot take place all at once. Evolution in these matters is something that is gradual. And it may be that Mr. Wordingham's aspirations of years ago, and an aspiration that is still his, as to a closer working alliance between the two industries, will be realized in many places before he is much older. Then where will be the advantage of super-generating stations and costly distributing systems?

Sir Arthur Duckham Propounds a New Industrial Scheme.

WE all know what is the position of labour in industry. Labour is an integrant in a combination in which brains and capital are equal parts, but antecedent as necessaries to the establishing and success of an industry. This is a commonplace statement of fact to men of any sense. The important thing to-day is that the labour problem is something of a more acute nature than ever before in industrial history. It has reached this condition not only in this country, but throughout the world. It is not far to seek for a reason for this. Through the war men have generally obtained a larger outlook—the workers among them. They have seen in victory the power of combination; and, not contented to remain where they were, they are using the power to raise their position in the world. No one can blame them for this. What they can legitimately be blamed for is that they do not realize (or pretend not to realize) the existence of limits in industry, and that their co-operation is essential to develop production, so as to develop industry, and thus the field and the reward of employment. What is now upon us in the way of a graver and more intricate labour problem is precisely what thinking men were convinced would come sooner or later; and it may be said that the increased gravity and intricacy are the fruits of a stupid neglect on the part of employers in the years preceding the war. All the panacean schemes that have been during the past few years tumbling over each other for dealing with the situation should have been introduced and considered during the days of peace, and the approved one or ones there and then applied. But here we are with labour turbulence with a big crest upon it; and now, not in the past appropriate time, are men propounding schemes and trying to apply them when the receptive conditions are absolutely at their worst. Who should bear the blame for this delay—labour or the brains and capital that between them direct industry? Whatever the answer, the present position is the one that has to be dealt with; and the man who, with labour conditions where they are, can find a really acceptable way to bring labour, the directive and the incentive brains, and capital into harmonious and co-operative relationships for the purpose of progressively enlarging prosperity, will merit all the esteem and honour of a real genius.

The difficulties and dangers of the present state of things constitute, as Sir Arthur Duckham says in the Presidential Address he delivered to the Society of British Gas Industries at Sheffield last week, an impossible position for industry. Wages have risen to an enormous height, hours of labour have been reduced, production per man has been diminished, the cost of everything has gone up that is required for the well-being of industry; and the lofty barriers to development that have been erected by the conditions of transport, Government control, and taxation are discouraging in the extreme. But it is the extravagances (not the legitimate ambitions) of the workers that are the greatest evil, the origin of which extravagances are the brains of men who are not the true leaders, but those who have in these abnormal times—when the workers' minds are all upset by the high cost of everything necessary to life—the front place on the platform, and hold the ready ears of the workers with inflammatory speech and ultra ideas. These men have no care as to the effect of their policy upon the future; they are only out for immediate gain. What the results of their policy will be, wise discernment clearly shows. Industry is going to be retarded, its rate of expansion is going to be reduced, and the scope of the demand for men will not be what it otherwise might be. The myopic leaders (they are not all of that kind) say:

'Let us reduce the hours of employment; and this will "enlarge the scope of employment." This looks plausible on the surface; but it is fundamentally wrong. These men slaughter without any compunction the most elementary of economic principles and conditions; and the day will come when there will be vast rebelling on the part of labour over the results. The policy of these men has reduced production per man, and raised cost per unit of output. Sir Arthur gives calculated figures as to diminished output, which we know are confirmed by employers in other industries. The reduced production at higher costs means higher prices, and higher prices a purchasing demand lower than it otherwise would be; and thus a restriction of the limits of employment. To-day contracts are going abroad. We may ask why; to trouble to give an answer would be superfluous. The existence of hollow theories and sophisms points to this: Until the unions are purged of the blatant and short-sighted men who are leading astray, and workers of all grades realize that their point of view and part must be co-operative and not antagonistic if they wish industry—the source of their own well-being—to prosper, there is little hope of any scheme for establishing new conditions being universally approved and accepted, and a success.

As we have said, any man who produces a plan that would be a true solution of the labour problem would be a genius, and would merit all the honour that his contemporaries and even posterity could confer upon him. Sir Arthur Duckham does not attempt the task. As a matter of fact until he began to consider deeply the subject-matter of his address, it had not struck him how extensive were its ramifications, and how polyphased the considerations. The solution of the labour problem, in his opinion, is one for the collective brains of representatives of the components of organized industry. Even before this can come about, preliminary work will have to be done to get all parties to accept the principle of a community of interests between capital, the brains that direct and invent, and the workers. Until they are of one mind on this point, antagonistic feelings will enter the counsels and direction of any scheme that may be applied. Sir Arthur's plan is founded upon the principle of home rule for industry. This he thinks is the only solution. Industry must control industry. That is an acceptable basic proposition. For the inception of his scheme, he wants a temporary Council of Representatives of Employers' Federations and Workers' Unions. The work of the Council would be to fashion the details and to perfect a scheme which would establish a Parliament of Industry representative of all unions of workers and federations of employers. The Council, having then finished its work, would be dissolved. The authority of the Industrial Parliament should be as wide as possible, provided the well-being of the State is not endangered, and the liberty of the individual is safe-guarded. So far so good. But we see no provision in this Parliament for that vast mass of people, engaged on the technical, supervisory, and clerical work, whose brains are as necessary to the industrial system as those of the men in the Federations of Employers and the Unions of Workers. They, too, are workers, and workers whose responsibility in varying degree is considerable; and no Industrial Parliament would be complete without them. The scheme would necessitate that these workers should also become unionized, so that they could in the Industrial Parliament act in concert through elected representatives. They have not in most industries hitherto had their unions. But when they see the labourer and the man carrying less responsibility than themselves receiving equal and in some cases more lucrative pay for their services, it is time that they took a leaf out of the book of the trade unions and became organized. We do not like the idea; but when there is only one way of achieving an end, there is no option whatever but to take it. Sir Arthur's scheme would necessitate this, in order to make the Industrial Parliament truly representative.

The address includes quite an imposing, though not exhaustive, list of problems which the Industrial Parliament would have to consider. We will not deal with them generally, but merely refer to one which, it seems to us, would provide complication, and a fertile field for continuous dispute, and so keep the Industrial Parliament busy. At any rate, the members would find no lack of work even from this one matter of pay. We admit the gravity of the problem, and that serious consideration should be given to any scheme that is the product of anxious thought in the quest for a solution. It is generally agreed, says Sir Arthur, that all wages should increase in proportion to the cost of living. His solution of this problem is that all workers should receive a subsistence rate as well as wages, and that the subsistence rate should provide the necessaries of life to a worker and (say) three dependants. What are the necessaries of life? Who is to determine them? Are they to be standardized? What are necessaries of life to one worker, may not be the necessaries of life to another. And why three dependants? The specification is too suggestive to be of national advantage. It will hint to the worker that, as the subsistence rate does not extend beyond three dependants, his duty in the propagation of the human species will be satisfied by Sir Arthur's numerical proposal. And the number of dependants will subsequently be a useful point upon which to hang controversy for a graduated scale in the subsistence rate. We want to avoid supplying trade union extremists with fresh grounds for activity. Their inventiveness needs no assistance. The subsistence rate, too, should, according to Sir Arthur, be alike for all workers in an area. What does this signify—that he has in mind different subsistence rates for different areas? Why not for different occupations? The navvy should surely have a higher subsistence rate than the man in some sedentary occupation, though the latter may be entitled to higher wages. Who is going to decide these things? The Industrial Parliament? If so, we should hope to be excused from becoming members. As to the wage rate, the same standard should be applied to all the workers in the same class, whatever or wherever the industry; and the wage rate should be augmented by payment by results. The first part of this should be subject to conditions. For example, we should not pay a porter at a country railway station the same wages as a porter at a large railway centre.

We will not off-hand positively condemn the new scheme. This would not be fair. But frankly, Sir Arthur, at first blush we do not like the complicated wage suggestion. Let us have an Industrial Parliament by all means, so long as it completely represents all components in the industrial system. But let us have no more complexity than is really necessary in determining payments. Give us a plain wage, with an additional payment depending on the profits of the business—co-partnership or something akin to it. There is, of course, no definite formula for co-partnership that can be applied to all industries; but where there is the will, there is a way of applying a system of the kind. Sir Arthur recommends representation of the workers on the Board of Directors, and a share in the benefits. He is at heart a co-partner. It is the interest of the worker, and his participation in the direction and in the benefits and losses of industry, that provide the best way to industrial peace. If the artificial demarcation between capital and the workers could only be broken-down, the idea of essentiality and co-operation firmly implanted, and fair sharing in profit established, then we hardly think the scheme of an Industrial Parliament would be necessary. As it is, the idea is worth following up; and the Parliament, if it did its work properly, and did not attempt to indulge in visionary ideals in this very practical world of ours, would or should gradually bring into being conditions that eventually would leave it nothing to do but to attend to occasional rufflings of the surface of normal calmness. And if these were not sufficient for everlasting life, then the best thing the new Parliament could do would be to provide for its own obsequies.

Smoky Atmospheres or Smokeless Heating.

THE Ministry of Health Committee on Smoke and Noxious Vapours Abatement have just submitted an interim report; and the gas industry will find it good reading, though here and there in it there are incidental remarks which are obviously put in so as to show the disinterestedness of the members of the Committee, and to bid the electricians be of good cheer, and continue to labour against great odds and physical disabilities in the attempt to raise their commodity to a level at which its cost and application will be placed on practical competitive terms. The Committee, of course, are in a judicial capacity; and they have to take things as they are, with an eye on possibilities. Their work is to advise, with a view to reducing atmospheric pollution by the best practicable means. Their first conclusion is a very proper one. It is that the way for the authorities to attack the problem of the pollution of the atmosphere is to take steps to prevent additions being made to the sources of that pollution. "Prevention is better than cure." There

are a million new houses to be built within the next few years; and, compared with their predecessors, their contribution to air pollution should be restricted to the minimum. These houses present the opening for the introduction of a reform, which will stand as another evidence of our advancing civilization. If, however, the opportunity for constructive reform is allowed to slip-by, then we should deserve all the epithets of a deriding nature that our successors felt fit to apply to us.

The new houses are the reason for the Committee making an interim report as to the systems of smokeless heating that are available for the new houses. The Committee know they are pretty safe, both in respect of fuel economy and the limits of the pockets of the prospective tenants of the new houses, in not recommending electricity for any heating purpose—to say nothing of the cost of installation, and providing the appliances. If the Committee want to know more concerning this matter, they should study Sir Dugald Clerk's recent writings on the subject. However, they recommend the installation of gas-cookers in lieu of coal-ranges in all new dwellings. They are looking to the central supply of hot water wherever the conditions are suitable; but otherwise they recommend coke-fired boilers. Their encouraging remarks as to central hot-water supply for detached houses is subject to provision at moderate cost; and they consider that practical experiments in this direction are urgently needed. For tenement houses, they submit that a central supply of hot water is quite practicable; and that this should be provided universally, with coke or anthracite as the fuel. The abstract of the report does not show whether the Committee have been attracted by the facilities and high efficiency of gas-geysers, which can be used only as and when wanted, and so save all the heat losses that arise from storage and circulation. Preventable heat loss is money loss.

As far as practicable, gas-fires or hot-water radiators are recommended for domestic heating; and electric radiators are parenthetically mentioned, "subject to the question of cost." The Committee thereby show their impartiality. As a sacrifice of principles to prejudice in favour of open coal fires, the Committee recommend that in none of the houses to be built with the assistance of the Government subsidy should more than one, or, in exceptional circumstances, two coal grates be installed. This entirely conforms with recommendations that have emanated from official quarters of the gas industry. Quite a useful suggestion, not only in connection with the question of abating the smoke nuisance, but in relation to the modern curtailment of coal output, and therefore the more limited supplies available, is that all solid fuel ranges or grates should be of a character adapted to the use of not only coal but coke, and adequate means of regulating the draught should in all cases be provided.

We quite agree with the lament of the Committee as to the absence of full and scientific knowledge regarding domestic heating. This is one of the directions in which crude and labour-creating methods have been allowed to survive. Hence the permanent problem of air pollution; and hence, too, the expression of the feeling of the Committee that the whole subject of hygienic and scientific heating deserves a very much greater measure of public attention than it has hitherto received. One of the things up to which the public has to be educated is that the cost to them of smoke-polluted air is something which can be cancelled by, and so be placed to the credit of, smokeless means of heating—if the latter entails a somewhat higher direct cost.

Gas Costs and Profits.

In another column, a review is made of "Field's Analysis" for 1919, which is the best statistical record (now being carried on by Mr. H. E. Ibbs with the same scrupulous care that has made its reputation for accuracy) that we have of the progress made by gas undertakings and of the changes which they have passed through during the past fifty-one years. In the review some salient figures have been picked-out, and percentage figures calculated, to show the complete transformation that has been effected in the financial and working conditions of the industry in the comparatively short but momentous period between 1914 and 1919. Compared with the whole of the undertakings in the United Kingdom, the number dealt with in the "Analysis" are comparatively few, but they are all in the front rank, or have something special about them to cause their inclusion, and they represent a substantial percentage of the total output. The progress in business has been remarkable during the six years; their output having risen by no less than 10,009,000,000 c.ft., or 8·6 p.ct.—the gas sold in 1919 having been 126,656,000,000 c.ft. This increase has been secured despite the fact that the cost of coal increased per 1000 c.ft. of gas sold in the case of the Metropolitan Companies 145·94 p.ct. (net, 129·96 p.ct.); Suburban Companies, 118·11 p.ct. (net, 131·94 p.ct.); Provincial Companies, 110·7 p.ct. (net, 99·7 p.ct.); and Provincial Corporations, 81·45 p.ct. (net, 93·65 p.ct.). The working expenses for the four groups in the same order have increased by 82·27 p.ct., 63·66 p.ct., 100·41 p.ct., and 78·55 p.ct. The average price of gas, the big increase in the cost of coal and working expenses notwithstanding, only increased by 77·3 p.ct., 76·9 p.ct., 88·43 p.ct., and 59·91 p.ct. These figures are proof that gas consumers have not anything of which to complain compared with the prices of other commodities, and that they can well afford to restore a fair dividend to the capital employed in the service of supplying them with gas. How, through legislative conditions and restrictions, this capital has suffered is shown by the figures. In the case of the Metropolitan Companies the cost of dividends per 1000 c.ft. sold shows a decrease of 40·21 p.ct., Suburban Companies 44·67 p.ct., and Provincial Companies 25·50 p ct.

Coal Production and Costs.

The Board of Trade have issued a summary of the costs of production, proceeds, and profits for the first three months of the current year; and it gives, taking the figures as they stand, every justification for the action of the Government in the steps they have taken for restoring economic conditions to the industry. In considering the figures, however, the recent advance of miners' wages must be remembered; and, so remembering, it will be realized that the figures as presented are more favourable than they would be to-day. During the three months, 62,057,000 tons of coal were raised; and, deducting the consumption at the mines, and the supplies to miners for domestic use, the balance commercially disposable was 55,680,878 tons. Of this, 11,711,162 tons were shipped for export and foreign bunkers. On the basis of 55,680,878 tons for sale, the net cost of production works out to 29s. 4·94d. a ton, while sales at the pit-head realized 34s. 6·91d. —leaving a net surplus of 5s. 1·97d. per ton. From the surplus, provision has to be made for depreciation, interest on debentures and other loans, capital adjustments under the Finance Acts, and the profit to which the owners are entitled under the Act of this year. It should be pointed out, however, that of the ten mining districts six are producing at a loss. The four producing profits are: Northumberland (18s. 5·21d. per ton), Durham (8s. 4·85d. per ton), South Wales (18s. 7·67d. per ton), and Yorkshire (10s. 26d. per ton). The total net cost (29s. 4·94d.) is constituted as follows: Wages: 22s. 8·5d.; stores and timber, 4s. 6·99d.; other costs, management, salaries, insurance, repairs, office, selling, and general expenses, 1s. 7·7d.; and royalties, 7·53d.—less proceeds of miners' coal, 1·78d. Sir Robert Horne stated in the House recently that the cost of the increase of wages granted in March, 1920, was 2s. 10d. per ton; and the cost of the disposable inland coal now stood at 33s. 3d. per ton.

Gas-Workers' Strike Notices.

The kind intentions of the Minister of Labour to attempt to effect a compromise in the wages dispute in the gas industry proved ineffectual. The employees' side of the Joint Industrial Council for the gas industry moved him to action; and a meeting was called for last Tuesday evening. But the Chairman of the Council (Mr. D. Milne Watson) soon made it clear (according to the reports apparently inspired by the employees' representatives) that the gas industry had nothing whatever to offer, until legislation put the industry on to a proper financial basis. As the report stated, the meeting "brought matters no nearer a solution;" and, at the time of going to press, we have not been advised of any change in the situation. Thus the notices to leave work on June 26 held good. Referring to the matter yesterday, the "Daily Telegraph" remarked: "It would appear that the next move is with the Ministry of Labour; and it is believed that, if an arrangement could be made in regard to the smaller and less prosperous] undertakings, an agreement might be reached. The difficulty is that the Unions demand a flat-rate

advance of 10s., irrespective of local circumstances and conditions. It is believed that conferences at the Ministry of Labour may be held in a day or two."

Synthetic Ammonia and Nitrates.

Naturally, the gas industry will be following with a great deal of interest the production of synthetic ammonia and nitrates by the Company which Messrs. Brunner, Mond, & Co., Ltd., have formed, under the title of Synthetic Ammonia and Nitrates, Ltd., and with a capital of £5,000,000. This is the Company who have taken over from the Government the Billingham works and plant, which latter, it is said, is a modification of the Haber process. The staff has also been transferred; and members of it have visited Germany and the United States to inspect work there. The operation of the experimental plant of M. Georges Claude has also been investigated; and the experimental plant of Dr. Maxted, of Gas Developments, Ltd., and patents, have been purchased by the new Company. They have had placed at their disposal by the Government (on a royalty basis) all enemy patents bearing on the modified process which will form the central feature of the working. We take it this means the Haber; and payments will go to the Custodian of Enemy Property, for account under the Reparation Clauses of the Peace Treaty.

Where the Gas Industry is Interested.

The Company, it is reported, intend to erect immediately a plant for the manufacture of 100 tons of 100 p.ct. ammonia per day, with provision for a rapid extension to 300 tons a day, equal to 150,000 tons, rising to 450,000 tons, of sulphate per annum. It is pointed out that modern agricultural research has, however, proved that chloride of ammonia is equal, if not superior, to sulphate; and since by converting the ammonia into this form instead of sulphate, carbonate of soda (soda ash) can be produced, it is hoped the agricultural community will eventually adopt this form, which can only have the effect of reducing the price to them of nitrogen fertilizers. Arrangements have been made with Explosives Trades, Limited, by which they undertake to buy their requirements of ammonia from the Company, and to erect plant to the extent desired by the Government for the oxidation of the ammonia to form nitric acid and the explosives derived therefrom. The development has a big commercial significance for present producers of nitrogen fertilizers.

PERSONAL.

The anniversary of the seventieth birthday of Mr. WILLIAM A. SURRIDGE, J.P., on Saturday last, was made the occasion of his partners in the firm of Messrs. E. Foster & Co., of John Street, Adelphi, to present him with a handsome solid silver loving-cup, suitably engraved. The gift was handed to Mr. Surridge at a private luncheon at the Constitutional Club, Northumberland Avenue, presided over by Mr. Reginald W. Foster, with Mr. H. D. Foster in the vice-chair. Mr. Surridge, in acknowledging the presentation, indulged in many happy reminiscences of his early life in connection with the gas industry; and he recalled the names of many of the friends he had made during his long business career.

Mr. H. C. SMITH, Superintendent at the Swan Village Gas-Works of the Birmingham Corporation, has been appointed Resident Engineer to the Tottenham District Light, Heat, and Power Company, in succession to Mr. R. Wardell.

OBITUARY.

Mr. ALBERT R. CAWLEY, who died last month at Cardiff, after having been in indifferent health for some considerable time, had had a long connection with the gas and water industries. For a number of years he was engaged at the gas and water works of the Oldham Corporation, and then for four years had the management of the Darwen Corporation Water-Works. In 1894 he was appointed General Manager to the Ystrad Gas and Water Company; and three years later he became Manager and Secretary to the Llanelly Gas Company. His next move was in 1902, when he took up the position of Manager to the Rhymney and Aber Valleys Gas and Water Company, which he resigned in 1906. He was a member of the Institution of Gas Engineers.

Temporary Increase of Charges Act.—Applications have been made to the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act, by the Cleator Moor Urban District Council, the Milton Regis Urban District Council, the Portland Urban District Council, the Shepshed Urban District Council, and the Southport Town Council.

"FIELD'S ANALYSIS" FOR 1919.*

Some Extraordinary Figures and Comparisons.

WE have received the fifty-first edition of "Field's Analysis," and have turned to it with great interest, inasmuch as we knew that it was bound to contain in these extraordinary times figures of an exceptional nature. During the war, it was natural to think that at its conclusion the climax of high costs would be reached, and that thereafter a steady decline would take place until a definite level was reached, however far above pre-war normality that might be. The figures that are presented to us, however, in the gas industry's standard "Analysis" dispel completely any illusion we may have had upon this subject; and events which have taken place since the close of 1919 up to the present moment alter the whole character of our thoughts upon the subject, and one wonders when and how a climax will be reached, and when and how a move in the direction of lower costs will materialize.

Speaking of costs, it may not be amiss to refer to the price of the present edition of the "Analysis." We observe it has been advanced to two guineas a copy. To no one is this likely to come as a surprise—certainly not to anyone in the printing trade. For our part we make no comment whatever against the price. Apart from the question of high printing costs, no one we are sure will complain of a charge of two guineas for the comprehensive and valuable information contained in the work; for it would be in the nature of a mild disaster to the industry, if it were found impossible for the "Analysis" to be issued owing to a loss on its production.

With these preliminary remarks, we will turn to the contents of the present edition. The first thing that strikes us is the enormous output of gas. The gas sold by the undertakings dealt with in 1914 was 116,647 million c.ft. The quantity sold in 1919 amounted to 126,656 million c.ft., or an increase of 8·6 p.ct. In any ordinary trading concern, one would expect to find this increase reflected in the profits; but this is not so in the gas industry, as can be seen by taking the figures of gross profit in the case of the Metropolitan and Suburban Gas Companies (which are sufficiently indicative of the whole). The figures show a fall from £1,784,449 in 1914 to £1,642,096 in 1919, or a *decrease* of 8 p.ct. Could such an extraordinary statement be produced by any other industry in the country? We do not think that economists will turn to the pages of this work for figures wherewith to prove existing maxims.

As a matter of more domestic interest—that is, interest for the industry itself—we have set out in tabular form some of the principal items in the four representative groups.

Years.	Metropolitan Companies.	Suburban Companies.	Prov. Companies.	Prov. Corpns.
	d.	d.	d.	d.
Cost of coal p. 1000 c.ft. sold 1914	15·39	16·51	14·96	14·38
1919	37·85	36 01	31·52	26·09
Increase per cent.	145·94	118·11	110·70	81·43
	d.	d.	d.	d.
Net coal p. 1000 c.ft. sold 1914	6·71	8·83	6·70	5·04
1919	15·43	20·48	13·38	9·76
Increase per cent.	129·96	131·94	99·70	93·65
	d.	d.	d.	d.
Working expenses p. 1000 c.ft. sold 1914	18·11	17·64	12·30	11·89
1919	33·01	28·87	24·65	21·23
Increase per cent.	82·27	63·66	100·41	78·55
	d.	d.	d.	d.
Average price of gas p. 1000 c.ft. sold 1914	28·2	27·7	21·6	23·2
1919	50·0	49 0	40 7	37·1
Increase per cent.	77 30	76·90	88·43	59·91
	s. d.	s. d.	s. d.	s. d.
Residuals per ton of coal 1914	10 3·2	10 3·8	8 6·1	9 4 9
1919	25 7·1	20 6·0	19 9·8	18 7 2
Increase per cent.	149·27	98·71	132·91	97·70
	d.	d.	d.	d.
Total charge for capital p. 1000 c.ft. sold 1914	9 78	7 49	6·35	2·79
1919	6·64	5·26	5·29	3·20
Decrease per cent.	32·11	29·77	16·69	Inc. 14·70
	d.	d.	d.	d.
Dividend paid p. 1000 c.ft. sold 1914	8·38	6·47	5·53	—
1919	5·01	3·58	4·12	—
Decrease per cent.	40·21	44·67	25·50	—

It will be seen that the increase in cost of coal per 1000 c.ft. sold, was the highest in the Metropolitan group of companies, being nearly 146 p.ct, compared with 1914. The increase in the net coal was a shade under 130 p.ct.; and the working expenses were 82 p.ct. higher, whereas the price charged for gas advanced only about 77 p.ct. The total charge for capital on the other

* "Field's Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland, and Ireland." Compiled by Herbert Edward Ibbs, Accountant to the Gas Light and Coke Company. Price £2 2s. London: Eden, Fisher, & Co., Ltd.

hand decreased 32 p.ct.; and, taking dividends separately, the decrease was 40 p.ct. Very much the same story might be told of the Suburban group of companies.

When we come to the Provincial companies, we find that the percentage of increase for coal and net coal is much below the Metropolitan and Suburban groups; whereas the percentage increases in working expenses and price of gas are higher than in any of the four groups. The total charge for capital is only 17 p.ct. below that of 1914. The dividends, however, were about 25 p.ct. lower, compared with 40 p.ct. for the Metropolitan Companies, and 44 p.ct. for companies in the Suburban group. With regard to the Provincial corporations, it will be seen that the geographical position apparently told very strongly in their favour as far as coal was concerned, and that they did nearly as well as the Suburban companies with residuals; the result being that the increase in the price of gas was comparatively small. It is noticeable that the charge for capital here increased by nearly 15 p.ct., which was quite contrary to the experience of the rest of the industry.

The "Analysis" reveals the need of many companies for more capital, which will not be forthcoming unless Parliament allows a reasonable dividend to the existing shareholders. As soon as the confidence of investors has been re-established, there need be no uncertainty as to the future. The progress of the industry is most marked, as will be seen from the following table—whether the gas sold or the number of consumers be taken:

Years.	Metropolitan Companies.	Suburban Companies.	Prov. Companies.	Prov. Corpns.
	Millions.	Millions.	Millions.	Millions.
Gas sold to ordinary consumers 1914	27,958	8,215	13,626	22,364
Gas sold to ordinary consumers 1919	28,781	9,231	14,346	23,533
Increase per cent.	2·94	12·37	5·28	5·23
Gas sold to automatic consumers 1914	14,181	4,646	3,102	5,287
Gas sold to automatic consumers 1919	17,916	6,230	4,491	6,421
Increase per cent.	26·34	34·09	44·78	21·45
Total gas sold to private consumers 1914	42,139	12,861	16,728	27,651
Total gas sold to private consumers 1919	46,697	15,461	18,837	29,954
Increase per cent.	10·82	20·22	12·61	8·33
	Thousands.	Thousands.	Thousands.	Thousands.
Number of ordinary consumers 1914	422	160	289	536
Number of ordinary consumers 1919	439	178	303	534
Increase per cent.	4·03	11·25	4·84	Dec. 37
Number of automatic consumers 1914	861	257	205	366
Number of automatic consumers 1919	893	283	215	397
Increase per cent.	3·72	10·12	4·88	8·47
Total number of private consumers 1914	1,283	417	494	902
Total number of private consumers 1919	1,332	461	518	931
Increase per cent.	3·82	10·55	4·86	3·22

The increased quantities of gas sold to ordinary consumers must be considered as very satisfactory, as also the increased quantities sold to automatic consumers, which latter vary as regards groups from 21 to 44 p.ct. An increased sale per consumer is always a most desirable thing to aim for. New customers are needed for healthy progress.

If we take the stoves on hire, the increases shown also confirm progress.

Years.	Metropolitan Companies.	Suburban Companies.	Prov. Companies	Prov. Corporations.
	Thousands.	Thousands.	Thousands.	Thousands.
Stoves on hire 1914	1072	351	293	445
Stoves on hire 1919	1132	423	339	543
Increase per cent.	5·60	20·51	15·70	22·02

The increases in the number of consumers and stoves on hire would undoubtedly have been much larger had more meters and stoves been obtainable. The relatively small increase in stoves on hire in the Metropolitan group is, we believe, due to a large number of stoves having been sold to consumers who preferred to purchase rather than to pay a higher stove rental.

The high standard of the "Analysis" has been fully maintained, and no cursory glance such as has been given above can possibly reveal the immense amount of information that the book contains. The figures quoted by us are merely samples from the bulk, for which we have to thank the Editor, Mr. H. E. Ibbs, the Accountant of the Gas Light and Coke Company. Heavy work and painstaking care are found on every page; and so is the working and financial history of the industry in the exceptional circumstances of these unprecedented times.

Presentation to Mr. Cyril Davis.—A very pleasing ceremony during the annual meeting of the Society of British Gas Industries which was held last week at Sheffield, was the presentation to Mr. Cyril Davis by Sir Arthur Duckham, K.C.B., the President of the Society, of a very handsome gold watch, on the occasion of his relinquishing the Honorary Secretaryship of the Golfing Society, the duties of which he had ably carried out for many years, and for the formation of which he was responsible.

ELECTRICITY SUPPLY MEMORANDA.

THE electricity journals seem to have got the wind-up beautifully over Sir Dugald Clerk; and their main business preceding the discussion at the Institution of Electrical Engineers last Wednesday seems to have been to try to belittle him personally, rather than to categorically show that his statements on the subject of thermal efficiencies and coal conservation are altogether wrong. In the "Memoranda" for June 1, we referred to a tissue of personalities and innuendos concerning Lord Moulton and Sir Dugald Clerk that appeared in "Electrical Industries" from a "Correspondent." Manifestly one of the objects of the article was to depreciate the work of these two distinguished men in this matter of thermal efficiency in relation to coal conservation. It turns out that their critic is Mr. H. E. Goody, who describes himself in a letter to our contemporary as an electrical journalist, and who criticized not what Lord Moulton and Sir Dugald had put forward, but their action in supporting the position of gas in this matter of thermal efficiency. Conviction as to the truth of the position is, in the opinion of Mr. Goody, patently no justification for telling the world of it. Drawn by the "Memoranda" to disclose himself, Mr. Goody does not answer the criticisms that we made of his previous efforts. He still appears to suggest that Lord Moulton and Sir Dugald should be regarded as gas propagandists rather than as impartial scientists. We get further emphasis laid on the want of impartiality by these two scientists when Mr. Goody says: "These gentlemen are accorded the consideration due to the absolutely unbiassed scientist, whereas they are quite evidently bound to the gas chariot." These and other references to the British Commercial Gas Association are bringing Mr. Goody and "Electrical Industries" close to dangerous ground. Everything that Sir Dugald has done in this matter since he and his collaborators presented their report to the Council of the Institution of Gas Engineers has been done on his own initiative or by request of the Societies before whom he has appeared. If scientific men in their work are to be exposed to such crude personal attacks as these in papers classified as "technical," then we may expect that it will not do anything to encourage publicity of the results, and of free discussion. The want of impartiality can only be proved by showing that deliberately stated wrong results have emanated from the men of science who are the authors. Mr. Goody childishly speaks of the statements of fact by Lord Moulton and Sir Dugald Clerk as "their offence."

Electrical Press on the Rampage.

More Insinuation.

Mr. Goody in his letter evades the main points of our previous criticism. Sir Dugald's interest and that of Professors Smithells and Cobb in coal conservation and the thermal efficiencies of fuel use date back many years. We pointed out, in order to disabuse Mr. Goody's mind of erroneous imagination, that the invitation to them to investigate and report upon the relative positions of gas and electricity in relation to coal conservation was made by the Council of the Institution of Gas Engineers, and that the Council were prompted to take this course by certain statements in the report of the Power Sub-Committee of the Coal Conservation Committee. The object of inviting them to undertake the work was not "gas propaganda" as it is understood by Mr. Goody and his like, but with the view of putting the facts—whatever they were—into a technically ordered condition, and in a manner which, if they were wrong, could be controverted. Mr. Goody's comment upon this is full of insinuation, which to our mind is insulting, to men of the scientific status and independence of those named—men who have always been treated with respect in the scientific world, and whose opinions are held worthy of acceptance until, if it be possible, they have been shown to have erred. Has Mr. Goody in any one way shown any error in the case put forward? This is what he says: "One would hardly expect the Institution of Gas Engineers to call upon Sir John Snell or Colonel Crompton to investigate the matter. *Obviously, they wanted a report of a certain kind; and they went to the men who could be relied upon to furnish such a report.*" Do other electrical men really think that Sir Dugald Clerk and Professors Smithells and Cobb would have reported anything but the exact issues of their investigation, and then expose the inexact issues to the investigation of the whole scientific and technical world? To have done so would have shown them to be lunatics, and not men of science. Do electrical men think that they would have undertook this reference if they were not to have a free hand, but were to report to order? Do not their honour, past work, and all we know of them stand for something more than that they should be subjected to such imputations as those contained in the letter now before us? Had Sir John Snell and Colonel Crompton made the same investigation, they could not have escaped from the same conclusions. If Sir John Snell and Colonel Crompton were to make research into what is being done in gas where the latest systems of production are in operation, and then test the efficiencies of the latest productions of our gas-consuming appliance manufacturers, they would have to say that the gas industry is not only doing all that Sir Duguld and Professors Smithells and Cobb say it is doing in this matter of efficiency, but that it has accomplished more for which full credit has not

been taken, for the simple reason that it is not general, and cannot be until opportunity in individual works and supply areas permits. There is nothing hypothetical about what gas has accomplished; there is about the 20 p.ct. thermal efficiency of the electricity supply industry becoming general. Still foolishly insisting that a matter of technical importance is gas "propaganda," Mr. Goody in the final passages of his letter tries to shift the ground of his censure from persons to the electricity industry; but even his present letter shows the inclination of his mind in regard to the matter, as did his article. He writes: "I called this propaganda insidious; and so it is in the literal sense. But it is perfectly legitimate and moral; and all my censure was directed against the electrical industry for not following so excellent an example." If "all" his censure was intended to be directed against the electrical industry, then Mr. Goody sadly failed in his intention, or the censure took a very circuitous route, and drew in men who quite unconsciously had given Mr. Goody offence.

Prior to the Discussion.

We turn to the issue of the "Electrical Review" preceding the discussion at the meeting of the Institution of Electrical Engineers. An editorial article has something to say about the all-electric house; and we see a little more general abuse and postulation concerning gas, but not a single fact. It states that "coal and gas cannot by any possibility render service equivalent to that of electricity; but they can, and do, introduce an intolerable amount of dirt, dust, labour, and pollution, all of which have to be paid for in terms of health and pocket." We are prepared to prove and to demonstrate to the "Review" that electricity for several domestic and industrial purposes is incapable of rendering service equivalent to that of gas, whether regarded from the money or the time point of view, if our contemporary is willing to enter seriously into the matter. We should like to have, too, something more specific as to "the intolerable amount of dirt, dust, labour, and pollution of the atmosphere" that gas is supposed to produce; as well as regarding the supposed injurious effects of gas upon health. That the "Review" has nothing specific to offer, but that it only relies on its individual assumption (which suits it admirably), and not on actual facts or scientific exploration, is shown by the liberally loose statement: "Could these items be accurately costed, we have no doubt at all that the actual inclusive cost of electrical supply would come below that of its grimy rivals—or rather competitors, not rivals." Having shown that it has no solid ground for its theory, this assures us that the "no doubt" is equally without substantial foundation. And then comes a sly dig at Sir Dugald Clerk: "As we have said before," remarks our contemporary, "paper calculations regarding thermal units, &c., are incapable of demonstrating the facts in the comparison. They deal only with one aspect of the subject; and they entirely fail to take account of the factors which cannot be neglected—not least of which is the great saving of labour effected by electrical methods. Public opinion does take these factors into account; and there is no room for doubt as to its verdict." These so-called "paper calculations" are based on the facts of actual performance. Gas is a huge labour-saver; and that is the reason, combined with the lower installation and running costs, that it has such an area of use, and extensive popularity. "Public opinion does take these factors into account; and there is no room for doubt as to its verdict." This is why the gas business is so large, why it is expanding, and why its prospects, including its high thermal efficiency in the use of coal, are so wonderfully bright.

Also in Other Quarters.

Turning to other journalistic electrical quarters, we see in an editorial in "Electrical Industries," in which Sir Dugald Clerk is also attacked—this a week before the discussion with the Institution of Electrical Engineers—the "secondary advantages" of electricity are put forward as the reason of its successes. The primary advantages of gas over electricity are what tell in the decisions of the masses of the people. Both "Electrical Industries" and the "Electrician" are obviously very uneasy over Sir Dugald's activity in this matter of relative efficiencies. The former suggests that he should ask himself whether friendly relations between the two industries "are assisted by assiduity in placing limits to electrical progress, and supplying Mrs. Cloudsley Brereton with ammunition for attacks on electricity." The "Electrician" is of opinion that "at the present time there is generally an open mind on the relative merits of electricity and gas. But the gas interests are doing their best to alter that; and it is therefore all the more necessary that we should be quickly in the field." The "Electrical Times" likewise had a shot six days before the discussion at the Institution of Electrical Engineers. In what it says, one can also trace the great virtue of secondary considerations where electricity is concerned. It refers to the diagrams of Sir Dugald Clerk, which, it remarks, have been "the subject of some pardonable amusement." The "pardonable amusement" has been on the gas side over the curious wrigglings of the Electrical Press to avoid coming into close contact with the diagrams and accompanying text. The facility of the electrical papers for writing all round this subject without attacking the kernel is something that merits, and has on several occasions caused, the heartiest laughter among gas men, and no doubt electricians also.

The Test.

At Leicester, an experiment with gas and electricity is going to be made, apparently in connection with the municipal plans for increased local housing. A block of houses is to be provided with gas for domestic purposes and electricity for lighting; and in another block gas is to be used for both lighting and other domestic purposes. Gas is having more than its fair share in the test. Why not try one block with both electric lighting and the use of current for other domestic purposes? There seems something wrong in what is proposed if we accept as gospel what such papers as the "Electrical Review" say. Perhaps the Leicester Corporation do not want to be parties to helping to land the tenants of these blocks of dwellings in the Bankruptcy Court. The "Electrical Times" offers "two to one on electricity;" but electricity does not seem to have much to do with the test.

Deficits and Sales Under Total Cost.

Deficits are becoming more and more the normal thing in connection with local authority electricity supply undertakings. It is a bad sign; and balance-sheets that show such deficits are a reflection on the administration, for no one can defend the policy of running at a loss a business that has a monopoly of a particular commodity in a district. The number of undertakings with a deficit is too great to keep a record of them all. But we observe that the Electricity Committee at Ilford have been carrying on their works in a manner that caused a loss at March 31, 1919, of £10,261. At his audit, the District Auditor disallowed this sum; and against this the Council appealed to the Ministry of Health. The Ministry states that the disallowance was lawfully made, and accordingly it has been confirmed. Before taking steps to deal with the deficiency, a report was called for by the Ministry as to the extinction of the sum. The Clerk has informed the Ministry in reply that a rate of 5d. in the pound has been made for the ensuing half year to meet the heavy sum short of requirement. The attention of the Ministry should be called to what this means. Is it fair—can any honest man defend the course—that the local authority should sell current at a price that does not meet total costs, and then pick the pockets of the ratepayers who are not consumers of electricity of 5d. in the pound on the rateable value of their premises or dwelling-houses? Why should any gas consumer pay 5d. in the pound towards the cost of supplying his neighbour with electricity? The electricity consumer is never asked for 5d. in the pound to make up the deficiency in the revenue of the gas company. The whole process is a scandal; and certainly the ease with which deficits can be made up as Ilford is doing in this case, is a direct incentive to maladministration. The Ministry of Health ought to assure itself that such a thing does not occur again, and ensure that Ilford is compelled to charge prices that will obviate the necessity for committing another injustice in order to straighten out things. To be just, the deficit ought to be made up by the people who received electricity at a price less than the total expenditure incurred in providing it. There was a considerable deficit at Leicester on the working for 1919; but it is hoped to wipe this out by economies produced by the new plant at Aylestone Road, and by a 25 p.ct. increase in the power rates. The Colchester Town Council have managed to bring about a deficit of £3532; and they are making provision against a repetition of this sort of thing by raising the price of current to 9d. per unit.

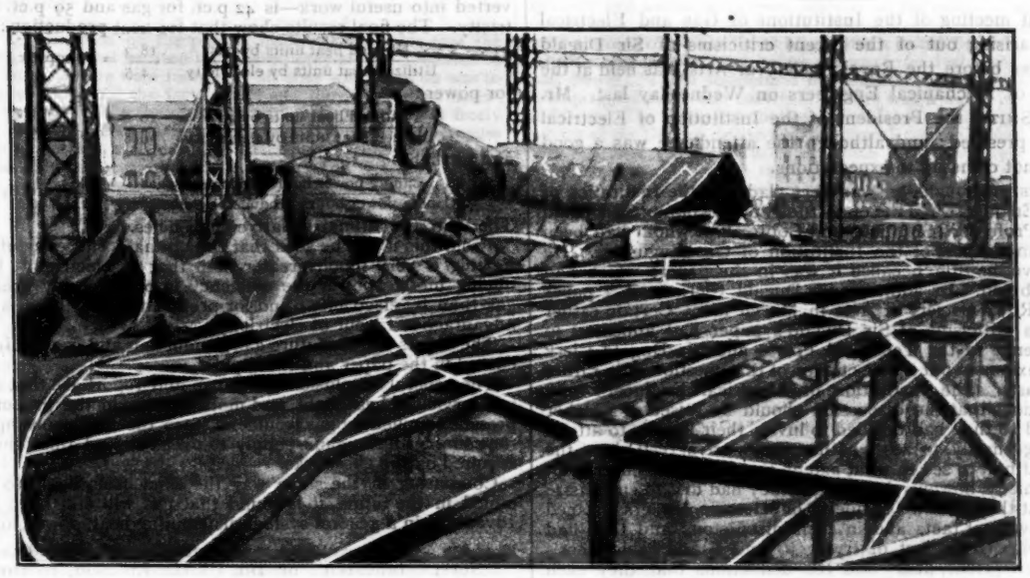
Sir Dugald Clerk's "Gas Institute" Proposal.

Writing his page of "Trade Chat" in the June 12 issue of the "Ironmonger," the versatile author whose *nom-de-plume* is "Vulcan" thus refers to the above topic: Sir Dugald Clerk, who has been President of the Institution of Gas Engineers during the past year, at his retirement delivered an address on the future of the gas industry. Sir Dugald holds the opinion that it is necessary at the present time to pay increasing attention to gas apparatus and plant. He also advocates the making of independent investigation into the claims of manufacturers in regard to the efficiency and economy of their appliances. With this object in view, he suggests the establishment of a Gas Institute, which should be devoted solely to studying, testing, and reporting on such apparatus, and which would grant to inventors and manufacturers certificates giving the results of the various tests to which their inventions were put. The establishment of a Gas Institute would, Sir Dugald is convinced, stimulate invention in gas appliances. The scientific and practical staff attached to the Institute could also systematize the collection of data for the industry. Apart from the technical side, the Institute might foster friendly relations between the gas and electrical industries. There is certainly room for a change of policy in this direction.

A meeting was held last Thursday of the Technical Sub-Committee of the Fuel Economy Committee of the Federation of British Industries to determine the future course of procedure of their fuel economy organization.

The distillation of lignite at a high temperature is said to give a liquid coal tar which contains certain ingredients suitable as a substitute for gasolene, kerosene, and lubricating oils. Through a new process, benzene and kerosene can be obtained from liquid coal tar distilled from lignite at a lower temperature.

THE WRECK OF A THREE MILLION C.FT. GASHOLDER IN MELBOURNE.



Newspaper accounts and photographs are now to hand of the destruction of the 3 million c.ft. gasholder, on the morning of Sunday, April 4, at the Port Melbourne Station of the Metropolitan Gas Company of Melbourne.

It is stated that the holder, which at the time contained 2 million c.ft. of gas, "burst, and a column of flame 150 ft. in diameter leapt fully 400 ft. into the air." Fortunately, serious material damage was confined to the holder; and, with the exception of a few slight burns, there were no personal injuries. Earlier in the morning workmen had been attending to small matters in connection with the holder; and when they left, about an hour before the occurrence, everything appeared to be in order. There was no fire near the place; and no one could approach the holder without climbing a high brick wall.

The gasholder—a three-lift one—was built thirty years ago, and was seemingly in an excellent state of preservation; so that, until the matter is thoroughly investigated, the cause of its destruction cannot be definitely known. Various things "might" have happened, the newspaper reporter points out. The fire brigade were called, and attacked the jet of flame coming from the inlet-pipe. Meanwhile, in the valve-house the supply of gas had been reduced as far as could be done with safety. A feature of the occurrence was a rain of metal pellets which fell over a wide area all round the holder.

The Gas Company were able to announce that there would be no inconvenience to the public as a result of the mishap. The holder was used in connection with the gas service to St. Kilda and Tooronga; but these districts were supplied by connecting-up the mains to other stations. To the Company, of course, the loss was a serious one. Mr. J. N. Reeson (the Engineer-in-Chief), who reached the works as soon as possible, said, after inspecting the demolished gasholder, that he was at a loss to explain the occurrence. It could not have been an explosion, or there would have been considerable damage over a wide area. It was a curious thing that the gas should have caught fire. It looked as though something had burst, and that then there had been a collapse.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Works of the Ramie Company, Ltd.

Members of the above Association last Wednesday visited the works of the Ramie Company, Ltd., at Mellor and Bradbury. They were met at Stockport by Messrs. J. Warburton, S. Fielden, and B. Smith, and were conveyed by motor to the Marple Bridge works at Mellor, where they were received by Mr. A. Watson (the Secretary of the Company) and Mr. Bennett (Works Manager). The party was divided into three sections, and conducted through the works by Messrs. Watson, Bennett, and Warburton. The visitors then proceeded to Crossley's Café, at Stockport, where they were entertained at luncheon by the Ramie Company.

After luncheon, Mr. A. Watson gave a brief address of welcome, in which he expressed the pleasure of the Directors to entertain the party, and said they were very glad to be favoured with a visit by the members of the Association. Unfortunately, the Directors were in London on business, as also were Mr. W. Warburton and his colleague Mr. Heap (Managers). A toast to the Association was proposed by Mr. B. Smith; and the President (Mr. J. M'Lusky, of Halifax) suitably responded. Mr. C. D. Cawthra (Halifax) proposed the toast of the Ramie Company, and Mr. J. Warburton briefly replied on behalf of the firm. Mr. C. Roper (Bradford) proposed, and Mr. E. L. Oughton (Huddersfield) seconded, a hearty vote of thanks to the Directors and Managers of the works for their kindness, and expressed the indebtedness of the visitors to the staff who had in any respect helped to make the visit so successful. To this Mr. A. Watson briefly responded.

The party then motored to the Company's works at Bredbury. Here they were conducted round the works by the guides previously mentioned, along with Messrs. H. Watson, T. Tatlow, T. Wilson, and Miss Tunnicliffe, who were more intimately connected with the processes under view. On returning to Stockport the party were hospitably entertained at tea, thus bringing to a close one of the most pleasant and instructive works' visits that it has been the lot of the Association to enjoy.

Primrose Mills, Mellor.

Here the members were first introduced to ramie, or China grass. It is received at the works direct from China. Chinese natives have already removed the bark from the stalk, after which the fibre is pressed into bales and shipped to the works. The first process is to separate the gum, which is the dried sap of the plant, from the fibre, and prepare it for spinning. The process of spinning the fibre into ramie yarn was seen later at the Bredbury Mills. After the fibre is spun into yarn, it returns to Mellor mills for knitting into a cylindrical fabric. In making gas-mantles, the one great point is purity of material; and the third process at these works is of vital importance. All impurities are washed-out of the ramie knitted fabric. With the mills was purchased the adjoining watershed, on purpose that they might control, and thereby keep pure, the water, needed for this process.

Victoria Mills, Bredbury.

Here the first process is the spinning department. This work in all its branches is on very similar lines to ordinary cotton spinning. The knitted fabric, having been cleansed and purified at the Mellor works and returned to the Victoria Mills, is cut into various lengths according to the size of the mantle required. The mantles are then impregnated with a mixture of thorium and cerium nitrates dissolved in water, in such proportions that the mantle contains 99 p.ct. thorium and 1 p.ct. cerium oxide. Other processes follow, until the finished mantles are packed in the well-known "Zeimar" cardboard boxes.

The whole process of extracting thorium from monazite sand is carried out at these works. For some ten years before 1914 they had been making thorium on a moderate scale from numerous materials, including monazite sand. Since 1914, they have installed the largest plant in the country for this particular manufacture, and have thereby made themselves entirely independent of German supplies. They are fortunate in now being producers of both thorium and ramie fabric; the whole process from raw ramie grass and monazite sand to the finished mantle being carried out under most careful supervision.

Mr. William Laird Brown, M.E., of Philadelphia, representing American engineering interests, is now in London conferring with British manufacturing, importing, and banking houses, to arrange the working procedure for direct representation of English buyers in the American market. The firm are well known to the American gas industry; and their work has been the subject of special editorials in the "American Gas Engineering Journal."

THE THERMAL EFFICIENCY OF THE GENERATION AND USE OF GAS AND ELECTRICITY.

The joint meeting of the Institutions of Gas and Electrical Engineers arising out of the recent criticisms of Sir Dugald Clerk's paper before the Royal Society of Arts, was held at the Institution of Mechanical Engineers on Wednesday last. Mr. ROGER T. SMITH, the President of the Institution of Electrical Engineers, presided; and although the attendance was a good one, it did not come up to expectations.

The PRESIDENT said he was very glad that the Institution of Electrical Engineers had the opportunity of welcoming Sir Dugald Clerk and Professors Smithells and Cobb, all of whom had been associated in a report of the Institution of Gas Engineers. He need not give the title, because it was in the papers which had been distributed. In addition, Sir Dugald Clerk read a paper before the Royal Society of Arts in March last. Certain rather acrimonious criticisms of Sir Dugald's paper had appeared in correspondence in the Technical Press; and Sir Dugald Clerk had been anxious to put the discussion of this question on a rather different basis. The Institution of Electrical Engineers were equally anxious that the discussion should be raised to a higher plane; and so they had decided to invite their friends to attend this meeting—firstly, to see whether they were agreed about the facts, and, if not, to see to what extent they were agreed and not agreed. Chiefly, however, he thought they had met to emphasize the fact that they were all engineers or scientific workers engaged in the discovery of facts and in their discussion; and they had also met with the object of trying to understand each other's point of view [Hear, hear] and the deductions that they each made from these facts. It was largely for this reason that they wanted to be agreed as to the facts themselves. In a few moments he would have pleasure in calling upon Sir Dugald Clerk to open the discussion; but he would first like to say a word about procedure. On an occasion like this, it was necessary to organize the discussion; and he would call on various speakers to follow Sir Dugald Clerk. He would keep secret the amount of time allotted to each; but one minute before the time was up the bell would be rung, and a second ring when the time was finally up. He called upon Sir Dugald Clerk to open the discussion.

NOTE ON THE THERMAL EFFICIENCY OF THE GENERATION AND USE OF GAS AND ELECTRICITY.

By Sir DUGALD CLERK, K.B.E., D.Sc., F.R.S.

On March 19, 1919, I read, at the Royal Society of Arts, a paper entitled "Distribution of Heat, Light, and Motive Power by Gas and Electricity."

In conjunction with Professor Arthur Smithells, C.M.G., F.R.S., and Professor J. W. Cobb, C.B.E., B.Sc., I prepared a report addressed to the President of the Institution of Gas Engineers (who then was Mr. Samuel Glover). The report was entitled "On the Coal-Gas and Electrical Supply Industries of the United Kingdom." This report was communicated to the President of the Institution of Gas Engineers on April 14, 1919, and was published immediately thereafter.

As a good deal of somewhat irregular discussion dealing with these two documents has appeared in the Electrical Press, in a note to the "GAS JOURNAL" dated Feb. 10, 1920, I stated: "It would give me great pleasure to discuss my Royal Society of Arts paper and the report by Professors Smithells, Cobb, and myself at the Institution of Electrical Engineers, where I could meet competent electricians in a friendly debate. The question of the future efficiency, both for gas and electricity, could then be debated in a fair and honourable way."

In response to my request, your distinguished President, Mr. Roger T. Smith, invited me to meet Mr. Wordingham and himself, to decide on the feasibility of such a meeting. Your President, I am pleased to say, agreed with me as to the desirability of a debate with the Institution of Electrical Engineers.

I have great pleasure in opening that debate, as arranged, with a short statement of the matters raised in these documents as to the relative efficiencies of gas and electricity.

Both paper and report discuss fully the thermal efficiencies of generation and distribution of gas and electricity, and also the thermal efficiencies of use of gas and electricity by various appliances when distributed.

The general conclusions arrived at by Professors Smithells and Cobb and myself as to generation and distribution are summarized under the heading, "General Conclusions"—section 49 of the report. Both the present efficiencies and the future efficiencies for generation and distribution of gas and electricity are dealt with under nine heads.

In the body of the report details are given of the efficiency of use for the production of light, for domestic heating, for industrial heating, and for the production of motive power. This side is also treated of in the paper.

In order to show in a condensed form the relative thermal efficiencies of gas and electricity in generation, distribution, and use for heat, power, and light, I prepared the table annexed [This is the diagram that appeared in the "JOURNAL" for Feb. 10 last, p. 295] which deals with the values for the present average results for gas and electricity in the United Kingdom. The table shows clearly the various steps; and in these steps it will be noticed that the average efficiency of use for gas and electricity—that is, the proportion of the energy of the gas or electricity delivered converted into useful work—is 42 p.ct. for gas and 59 p.ct. for electricity. The final results show that for heat production:

$$\frac{\text{Utilized heat units by gas}}{\text{Utilized heat units by electricity}} = \frac{18{\cdot}3}{4{\cdot}5} = 4 \text{ (approx.)}$$

for power:

$$\frac{\text{Utilized heat units by gas}}{\text{Utilized heat units by electricity}} = \frac{10{\cdot}9}{6{\cdot}8} = 1{\cdot}6$$

and for light:

$$\frac{\text{Candle-power hours produced by gas}}{\text{Candle-power hours produced by electricity}} = \frac{203}{241} = 0{\cdot}84$$

These are the ultimate relative efficiencies.

From this it will be seen that the ultimate efficiency of gas for heating is very much greater than that of electricity; for producing motive power the efficiency is considerably greater by gas than by electricity; and for producing light, there is a small advantage in favour of electricity.

The values for the future gas production and use are fully discussed in the paper and the report.

The general conclusions of paper and report are that an electric service of heat, light, and motive power in the proportion at present supplied by gas would increase the fuel consumption of the country for the same supply to over two-and-a-half times that required by the gas-works.

Comparing in the same way the efficiencies likely to be obtained in the future, it is found that gas will still have a large advantage in a general system distributing heat, power, and light.

EXTRACT FROM THE REPORT ON THE COAL-GAS AND ELECTRICAL SUPPLY INDUSTRIES OF THE UNITED KINGDOM, TO THE PRESIDENT OF THE INSTITUTION OF GAS ENGINEERS.

GENERAL CONCLUSIONS.

49 (1) At present the gas-works of the United Kingdom carbonize 20 million tons of coal per annum, producing town's gas, coke, tar, and other bye-products, with a thermal efficiency of from 70 to 80 p.ct. Even regarding gas as the only useful product, and after allowing for transmission and all other losses, the consumer receives as inflammable gas at least 45 p.ct. of the heat value of the coal which has been used at the gas-works to produce and distribute it. Out of every 100 heat units in the coal used at the gas-works, 55 are reckoned as lost in the process of gas-making and distribution, and 45 are available for the use of the consumer.

(2) At present, the electricity generating stations of the United Kingdom—including electric railways—deliver 7·6 p.ct. of the heat of combustion to the consumer. The boiler loss, turbine loss, thermodynamic conversion of heat into work, and transmission loss account for over 92 p.ct. of the total heat. Out of every 100 heat units produced by combustion in the central station boiler-furnaces, 92 are lost as above described, and only 7·6 are available for the purposes of the consumer.

(3) *Gas thus distributes 45 units of heat out of 100 at the gas-works, instead of 7·6 units of heat out of 100 consumed at the central station to produce electricity.*

(4) At present the best existing electricity generating undertaking in the United Kingdom delivers 12 p.ct. to the consumer and loses 88 p.ct. Electricians promise for the future super-stations a delivery of 17·6 p.ct. Here the loss is 82·4 p.ct.

(5) At present the best existing gas practice in the United Kingdom delivers about 53 p.ct. of the heat in the coal used at the gas-works to produce it, and only loses 47 p.ct. in the work of generation and distribution to the consumer. In the early future, all gas-works could distribute as gas to the consumer one-half of the whole heat of the coal carbonized, leaving 33½ p.ct. of the whole heat in the unused coke and tar—thus realizing the high thermal efficiency of 75 p.ct. in the gasification process.

(6) *Thus, in the future, gas might be expected to deliver 75 heat units out of every 100, as compared with the 17·6 to be delivered by the prospective electricity super-station.*

(7) Except where temperatures above 1700° C. are required, electricity, even in the future, is extremely wasteful of fuel, when applied to supply heat. Gas is many times superior in the great mass of heating operations.

(8) For lighting and power production, electricity in the future promises results which compare more favourably with gas; but even here the higher efficiency of the gas-engine as compared with the steam-engine, the future economies in sight in the production of gas, and its use with incandescent mantles, render any monopoly claims of the electrical industries quite unjustifiable.

(9) Electricity is an efficient and convenient means of transmitting power and producing light. It is indispensable for electric railways, for transmitting power within works. It is required for many high temperature electro-chemical processes, and for all electrolytic processes. So that it fills an increasingly important field. It is an error, however, to suppose that electricity can economically displace gas for heat, light, and power.

Mr. C. H. WORDINGHAM said that for many years he had persistently advocated that gas and electrical engineers should join hands for the common good, instead of regarding one another as rivals. He had always held the view that the position of "Jack Sprat and his Wife" was the proper one for the two industries, and that between the two they could lick the public pretty clean. He had been equally criticized by his colleagues and by those whom he ventured to call some time ago "our friends the enemy;" but he was the more convinced that this was the proper attitude to adopt—viz., combination. Sir Dugald Clerk had given a number of figures which would no doubt raise a great deal

of controversy; but whatever they thought of them, they must be grateful to Sir Dugald for the extremely lucid way in which he had made clear his meaning. There was no doubt as to what he claimed, and he had invited criticism. When he saw, if he might so call it, Sir Dugald's challenge in the "GAS JOURNAL," he felt that it ought to be accepted, not only because if it were not accepted it would be construed as an admission on the part of electrical engineers that the figures were correct, but because he believed they all really wanted to get at the facts. There were facts, and all they wanted to do was to ascertain precisely what the facts were; and they could best ascertain them by approaching the matter in a scientific spirit and in freely discussing, on both sides, what the facts were. He did not propose himself to enter into a criticism of the figures; there were other speakers to follow him prepared to do this. The figures would be attacked. But he would like to make a few general observations on the whole subject. Sir Dugald Clerk had said, quite properly, that electricity was not a source of energy. It was, in fact, he might say, the gearing placed between the fuel and the consuming devices which utilized the energy of the fuel; and, as the gearing, it would be judged not only by its efficiency but by its convenience and adaptability. Rightly or wrongly, he thought there could be no doubt that the average member of the public liked this electrical gearing; and therefore there was a very good reason for employing it. Not only was it convenient, but its very convenience meant that the economy of heat was much higher than appeared from the figures given by Sir Dugald Clerk. The adaptability of electric motors, electric heating, and lighting was such that it was possible to do the same work with a smaller expenditure of energy, because it was possible to make economies with electric working which were not possible with gas working. For example, they could switch a motor off as often as they pleased; whereas they would think a good many times before they would stop a gas-engine and start it up again. When a gas-engine was running light, it was running very uneconomically and wasting a large amount of the heat, which, according to Sir Dugald Clerk, had been conserved from the coal. He wished to emphasize the adaptability of electricity, because it was of the very greatest importance to the controversy. It reminded him very much of the controversies during the war with regard to food—the various kinds of nourishment they could get, the fat producing and the flesh forming, and that sort of thing, which they read in scientific treatises. It was demonstrated to them perfectly plainly that much more nourishment was to be got out of certain foods than out of others; but the average man in the street would always prefer good English roast beef to beans and asparagus to cabbages. He regarded electricity as the asparagus and the roast beef, and gas as the beans and the cabbages. [Laughter.] Let them, for the moment, admit all the figures. It seemed to him that even then the proper policy was a combination of the two industries, and that gas could be very much better applied as an additional link in the chain and be utilized to drive electric generators, rather than that it should be supplied in its crude form to the consumer. He was not admitting the figures; he merely said that, even admitting them, this was his view. In this country, large gas-engines were at the present time very much under a cloud, perhaps because they were largely of German design. But he thought there was distinct hope that other designs—British designs—would, in the not very far distant future, appear. And if the efficiencies which Sir Dugald Clerk had mentioned as the limiting efficiencies towards which large designers might work were in fact realized, then they would get the advantages of the superior—if it were superior—economy in the gas-engine, combined with the advantages of electric gearing that he believed the public wanted and which, he believed, led very greatly to increased efficiency.

Prof. J. W. COBB said he would like, in the first instance, to thank the Institution of Electrical Engineers for their courtesy in inviting him to take part in the discussion, which should be so useful in encouraging a direct interchange of opinion and argument on a subject of vital importance. Proposals on the distribution of the energy of coal through electricity had been made recently. These proposals were of a very drastic nature from either the standpoint of the electrical industry or that of the gas industry; and they were made in the name of coal conservation. They raised, in a challenging form, the whole question of what was the best method of liberating and distributing the energy of coal—or, rather, the real question was, or ought to be, What were the agencies available, and what were their merits or demerits for a wide range of uses? If the question was put in this form, the gas industry came into the answer and claimed a place. Sir Dugald Clerk had made a brief statement which summarized, in very precise and simple terms, what the position appeared to be when Sir Dugald, Prof. Smithells, and himself went into the matter and reported upon it. In any scheme for utilizing the energy of coal they were concerned with processes of transformation and inevitable loss; and a scheme would be good from the point of view of fuel economy to the extent that these transformation losses were minimized. One of the most inefficient processes known for the transformation of energy was the conversion of heat units into motive power on the large scale. There was no subject to which greater attention had been paid, both by physicists and engineers; but intellectual and mechanical ingenuity of the highest order, working together, had never succeeded in altering this state of affairs. This inefficient process of transforming heat into power was a necessity so long as they were concerned with power alone. If the loss was not incurred at a central station, it had to be incurred somewhere else, and, in that case, usually a much heavier loss. For this and other reasons, the electrical power station was increasing its hold on the industrial public for the supply of power; and no one could have anything but praise for its continuing development. When the energy was wanted by the consumer for any purpose other than power, the conditions were completely altered. It was no longer necessary to load-up a process with the 80 or 90 p.ct. initial waste of the power station which no economy in use could counteract. To take the power station for the supply of energy in general was to load-up all the processes in use with the necessary inefficiency attaching to the generation of power; and that was not the high road to fuel economy. The gas industry seemed to have been rather overlooked in this matter; and an assertion of its position was necessary, and would, he believed, be beneficial to all concerned. It had undoubtedly come to be regarded by those who had not been under the necessity of understanding its methods, as an old-fashioned industry and, presumably, inefficient. There was a limited measure of truth in this view. Technical developments in the gas industry had undoubtedly been delayed by the extent to which it was governed by statutory regulations. These were imposed when gas was used almost exclusively for lighting with a naked flame, and not with incandescent mantles, and before gas was extensively used for heating and power. These restrictions had outlived their usefulness; their cramping influence had survived. There was a moral in this for any industry. The legislative changes which were now being made on the advice of Sir George Beilby and the Fuel Research Board, offered a new liberty to the gas industry of which there was every reason to suppose it would be very ready to avail itself. The accusation, or rather the vague supposition, of inefficiency in the gas industry was never justified. The process of carbonization, even as it was carried out in the older established plants of the country, in horizontal retorts, was by no means inefficient. All the products were valuable; and the bye-products were essential to any civilized nation. He would not trouble the meeting with figures, because these had already been placed before them; but he would call attention to the extent to which they were based, not upon what could be done in reconstructed plants, but on what was being done at the present time throughout the country. The root of the matter was that the efficiency at the gas-works was so high, and the losses on distribution so small, compared with the corresponding figures for electricity, that for most purposes a very handsome margin of economy remained with gas, even when they took into account the higher efficiency of some electrical appliances at the point of use. Even for power, they must not forget the high thermal efficiency of the gas-engine, which might have been the standard prime mover to-day if it had not been for the splendid engineering skill which had created the steam-turbine, and made it the recognized unit for the generation of power on a large scale. But the gas-engine could not be ignored. On the other hand, it would, of course, be quite foolish to attempt to limit the claims of the electrical industry to power and lighting on the assumption that it could never provide heat economically, although in a general sense this was true. There were processes where the temperature needs were such, or some conditions had to be satisfied, that the large initial loss in the generation of electricity could be counterbalanced by efficiency in use. Electricity could assert its claims and justify efficiency for such uses; but this was a very different thing from any wide claim to undertake heating operations in general for which electricity was very ill-adapted. In the natural course of things, both the electrical industry and the gas industry would grow by demonstrating that they could do certain kinds of work efficiently and well. There was neither need nor justification to make hot-house plants of either, nor could either industry be said to be in such a stage of development that it was advisable to stereotype throughout the country its present method and equipment. To put down very large stations and works all of very much the same type, and representing the same degree of development, would lock-up enormous capital, and incur a grave danger of hindering progress for many years to come. The position as regards fuel economy of the most modern power station was known to be very unsatisfactory. Technical literature of the last few years showed that the minds of the leaders in electrical matters were quite alive to this shortcoming, and were prospecting all round—active with a desire for improvement. The same might be said of the gas industry, which was examining its technical possibilities. He would mention an illustration—just one in which he had been personally interested. On the following evening, Prof. M'Lennan would deliver a lecture in that very hall on the production of helium. During the war, in America very interesting engineering work was done on this subject; and one of the results of the work was that it seemed extremely probable that the cost of oxygen was going to be much reduced—to the sort of figure that had not been contemplated before. His colleague, Mr. Hodsman, and himself had been calculating out what it would mean for the gas industry if oxygen was so far lowered in price—of which there was quite reasonable expectation—that it could be used in a continuous gasification process. They calculated on reasonable assumptions that complete gasification could then be effected with an efficiency of gas production of 90 p.ct. Supposing this could be done—and there was nothing inherently impossible or even improbable about it—the consumer could be supplied with a gaseous fuel in the production of which only 10 p.ct. of the original heat of the coal had been lost. He did not wish to enlarge unduly upon this, but referred to it as illustrating again what he had pointed out—that no one could foresee what the developments of the electrical industry or gas industry were going to be, and that the primary need of each was complete freedom to develop according to its own needs and proved capacities for public service.

Mr. C. H. MERZ said it was very difficult in the short time available to deal with the questions which Sir Dugald Clerk and his colleagues had raised. He agreed with other speakers that it was desirable to have this discussion, and that it would perhaps clear the air. As he was Vice-Chairman of the Committee who drew up the so-called Coal Conservation report, he perhaps ought to deal with one or two questions mentioned therein which had been referred to by Sir Dugald Clerk, and also generally to deal with some of the matters raised in the report. First of all, he would like to point out that he thought they would see, if they read the report again, that the primary object of it was to deal with economy of fuel in the production of motive power. There were, he believed, some references in footnotes to the use of electricity for heat; but it could not be said that the report dealt with this question. Sir Dugald Clerk and his colleagues immediately took the whole report and referred to it as if it dealt with heat energy. He had not read the discussions in the Press; but he had read some of Sir Dugald Clerk's able papers, and he did not think there was anything that he wished to alter on the question of the economy of fuel to be derived from an improved distribution of energy in a form available for motive power, as stated in the report. He would be surprised—although he had not consulted them—if his colleagues on the Committee differed from him in what he had said. The whole question was dealt with from the point of view of the production of motive power, and great care was taken to separate the fuel or coal used for

heating purposes in industry. The next question he would like to mention—although he believed it had been corrected—was the general criticism that the Coal Conservation Committee's report recommended the setting up of sixteen superstations that were going to supply the whole country. There was not a word of anything of the kind in the report. All the report suggested and recommended was that the country, for the purposes of the standardization of periodicity, &c.—in order that power might be collected where available and distributed to where it was used—should be divided into suitable electrical districts. This general policy had been approved, and the chief recommendation of the report, that Electricity Commissioners should be appointed to deal with this matter, had received the support of the Government. He believed also that the electrical industry was, generally speaking, very satisfied with what had been done, and was now chiefly anxious to be left alone, and that the Commissioners should be allowed to carry out their policy. He would like most emphatically to point out that he was sure nobody on the Coal Conservation Committee ever dreamed of one station to supply each of these areas. It clearly would not be economical to do so. It would not be economical from the distribution point of view. The only possible cases where they might tend to extreme centralization of this kind would be where there was a shortage of water facilities. Otherwise it was quite clear that energy would be collected into the main distribution system from points where it could not be most cheaply obtained. Another question which had been repeatedly referred to was that of the efficiency to be expected from modern electric power stations, and 17 and 18 p.ct. had been named as possible figures in the future. It was, perhaps, desirable to say that these figures were being daily obtained in various stations in this country and in America; and, what was more important, they were being obtained by the use of very inferior fuel. The figures in the Coal Conservation report were conservative, in that they were argued out on the basis of a comparatively high quality of fuel. The reason for this was that it was the fuel which, in general, was to be displaced throughout the country. The small man who generated his own power, or even the large manufacturer, generally to-day used a comparatively high quality of fuel—he had to use it in Lancashire boilers, and so on. If the value of the fuel for the purpose of the central stations was put down as anything like the quality taken for the purpose of the calculations in the report, the efficiencies would be very much higher than those he had mentioned as being obtained to-day.

Sir DUGALD CLERK: Higher than the 18 p.ct.?

Mr. MERZ: Yes. Continuing, he said he would not speak further as to the future, except to say that the chief complaint of electrical engineers was that they had not, except in one or two individual cases, had the opportunity—in this country, at any rate—of developing and using large units of motive power for the purpose of their central stations. Parliamentary legislation had prevented this. Sir Dugald Clerk had taken, as the basis of his calculations throughout, the thermal efficiency. As the Coal Conservation Committee's report dealt with the matter from a fuel point of view, he did not know that he could quarrel with this; but it was very necessary to point out, as had been mentioned by Mr. Wordingham, that it was not by any means the whole question. The whole question really was—and that was seen more and more since the war and as every day passed—how would labour be used to the best advantage. This was really the whole question from the point of view of the report, which was motive power. Coal was only labour, for practical purposes. He knew that various royalty owners and others were accused of taking a great deal of profit out of coal; but, practically speaking, as was seen from all the inquiries into the coal industry, coal was labour. Industrial processes were labour. If they took the average industry, they would find that probably the motive power represented, even at to-day's prices, from 5 to 10 p.ct. of the labour bill. It was quite clear that the man who was running this particular industry had got to consider "How can I save money; how can I produce my product more cheaply." The chief thing he had to save was the 90 p.ct., the labour; and he must have his motive power in the most available form. Therefore, it was impossible to expect an improvement—if they liked to put it so—in coal conservation by distributing something which, from the point of view of motive power, was not what the manufacturer wanted. The question of whether it paid to save coal or not—*i.e.*, the question of how far it was permissible to argue the whole subject on the purely thermal basis—was a question of the relative importance of saving labour in getting coal and saving labour in industry generally. This aspect was put forward in the Coal Conservation report in the clearest possible terms; and the more it was considered the more it would be seen that this was the true problem. Mr. Ferranti was perfectly right when he said that "electricity was the most useful medium; and therefore electrical energy for motive power could be most usefully and easily applied in a form that was most difficult to waste or use improperly." This was the interest of the manufacturer. If they went into this side of the matter, therefore, they would realize (especially with the present tendency as regards the cost of labour) that the important thing was that machines which did not automatically maintain their highest efficiency—which required attention, which required adjustment, which required skill—should not be put into the hands of the man in the street, or rather the man in the factory either, for that matter. Although it was not the present study of the matter, they should not be put into the hands of the woman in the house, either. They wanted machines which would run automatically. This was obtained in the electric motor, which maintained its efficiency if it ran at all. Sir Dugald Clerk had referred to the gas-engine on test as having efficiencies of 20 to 25 p.ct. at various loads; but anyone who had replaced gas-engines by electric motors knew that these efficiencies were not obtained or kept to in practice, except in very exceptional circumstancies. At least, if the efficiency of the gas-engine was anything like 20 to 25 p.ct., then he could only say that in a very large number of cases the efficiency of the electric motor which replaced it must be 200 p.ct. [Laughter] He would just again refer to the fact in regard to motive power—and that was the case their gas friends had to answer—that of recent factories to be put up a very large percentage had not only employed electricity, but employed electricity supplied from public mains. It was the older factories that retained other forms of motive power, where plant was in existence and where capital had been spent. And, of course, they must not forget the enormous amount of power that was used in what might be called the country districts of the country, where no gas was available. It was this power which was very largely responsible for the savings estimated, and he still believed to be obtained by the policy proposed in the report of the Coal Conservation Committee. The Coal Conservation report did not suggest that the gas industry should disappear; it did not propose entirely to replace it; it did not, he was going to say, attack the gas industry at all.

Sir DUGALD CLERK: Might I read you something from your own report? But I will do it later.

Mr. MERZ said he thought it would be found that what Sir Dugald referred to was very largely in foot notes; and he did not think that the gas industry, as was seen from the statistics of what had happened in other places where electricity had been developed largely—notably Chicago, which he had the honour of being connected with in an advisory capacity, and which was certainly one of the places where electricity had been developed more highly than anywhere else in the world—had suffered, and he certainly did not think that anybody, in writing the Coal Conservation report, thought or proposed that anything should be done than to encourage the gas industry as much as ever they could. The gas industry, as regards its improvement, was a question of the carbonization of coal; and the more the gas-engine or the internal combustion engine or the gas-turbine, if such was possible, were developed, the better for the electrical engineer. People in the electrical industry were quite satisfied to believe that electricity would be more and more the distributing agent; and if this was so, they could not wish for anything better than improved systems of generation. These might be obtained possibly through the medium of gas. It could not, except in special cases, be obtained at present. He had figures of some of the largest gas stations in the world, where accurate figures were kept as to output in a way which could be measured; and most of these large stations had not obtained efficiencies, reckoning year in and year out, which were as high as the figures he had mentioned for the best electrical stations to-day. He would be very glad if Sir Dugald Clerk could produce figures to the contrary. Of course, they must be figures not based on the estimated H.P.-hours or the estimated units output, but on the actual metered units. He would be very interested to know if such figures could be given. Of course, it could be seen that the gas industry was in somewhat of a dilemma. For the moment there was a triple alliance in which the distribution part of the industry had joined hands with the engineer and with the producers' side; but they had to make up their minds whether they really wanted to go for an improvement in the generation of gas, and whether they would not cater for the electrical engineer and supply him with his heat units. But the gas industry had not yet got to this point. Personally, he hoped they would. He would certainly be very glad in any concerns with which he was connected to discuss the purchase of heat units. They would all of them like to get rid of the use of coal. To-day the gas industry had not done this; and he did not think, except for their claims for efficiency on the heat side, that the gas industry could do it. However, he hoped they would develop matters from this point of view. He would like to close with the same note, to some extent, as Mr Wordingham had done, and that was that certainly they, as electrical engineers, wished that the two industries should be developed. Between them they could certainly do an enormous amount to improve the efficiency of labour and reduce the onerous part of it.

Mr. J. S. HIGHFIELD said that so much had been said already, especially by Mr. Merz, that it was difficult for him to add very much. He agreed with all that had been said about the great value of having a discussion of this sort. He could not imagine any two industries which in a measure served the public in similar ways; and he could not imagine anything more desirable than for the two industries to understand each other's point of view. He himself was always rather proud to think that he was one of the few electrical engineers who had actually got a joint contract for street lighting with one of the largest gas companies. If the thermal efficiencies given in the paper—which he was not questioning except in one respect—were the determining factor in settling whether electricity should be supplied rather than gas, it was perfectly evident that, except for light, electricity would not be supplied at all. Having regard to the fact that the gas industry started many years before the electricity industry, and that electricity worked its way up until it had become one of immense magnitude, it was quite clear that the thermal efficiency was not the determining factor. Neither was cost the determining factor. If they assumed efficiencies of 100 p.ct., and took electricity at a cost of 1½d. per unit, gas at 4s. per unit, and coal at 40s. per unit, at the expense of 1d. for electricity they could evaporate 2·36 lbs. of water from and at boiling point; with gas, they could evaporate 12·9 lbs. for 1d.; and with coal, from 60 to 70 lbs., according to the calorific value of the coal. So that even cost was not the determining factor; otherwise no gas would be sold. He was also interested to note—and it gave him hope for the future—that Sir Dugald Clerk, in all his illustrations, contemplated the replacement of gas by electricity, in spite of the fact that in so doing the expenditure of coal was going to be increased. He did not see in the paper one single example of the reverse process—the turning out of electricity and the substitution of gas. He dared say it was an accident; but the fact remained. Of course, to talk about substituting one for the other, and scrapping all the gas-works in the country and replacing the gas supply by electric supply, was simply out of the question altogether. The works would exist and continue to grow; and it was to everybody's benefit that they should do so. He imagined that for the supply of power over wide areas, gas would have no sort of chance at all. It could not be done. The supply of power to huge motors for collieries and to works of every description on the scale required would be impossible by gas or any other agent except electricity. On the other hand, for electricity to try in the great towns to supply all the small cottages with cooking apparatus would be probably equally impossible. Therefore it was clear that there were certain fields where the two could serve most useful purposes. Where gas could help the electrical industry very much was, as Mr. Merz had indicated, if it could show a better means of changing the heat energy

in the coal into power. This was what everybody was seeking; and if the gas engineer could accomplish some stage towards this desirable end, it would be all to the good. This end would have been accomplished much more easily had it not been for the necessity of building plants of the very largest size. If the plants had been confined to units of 2000 or 3000 H.P., he had not the least doubt that the gas-engine in power stations would have made great progress. But what had made this impossible, or at any rate extremely difficult, was the fact that a unit of 3000 KW. was very little good in the great power schemes that had to be contemplated to-day.

Mr. C. P. SPARKS agreed as to the desirability of a discussion of this kind, as it enabled members of the Institution of Electrical Engineers to combat some of the errors into which men in the gas industry had been led through analyzing statistics of the electrical industry without understanding their real value. There had been several references to the Coal Conservation Committee's report; and in addition to the remarks which had been made by Mr. Merz, he would like to say how much he regretted that the report was not read or examined before these references were made. The report specifically set out that the heating question, on which so much of Sir Dugald Clerk's paper had been built, was distinctly omitted. For instance, in section 9 it was stated: "If power supply in the United Kingdom were dealt with on comprehensive lines and advantage taken of the most modern engineering developments, the saving in coal throughout the country would, in the near future, amount to 55 million tons per annum on the present output of manufactured products." Then there was a footnote: "This figure takes no account of the saving possible on domestic coal consumption as the result of a comprehensive system of electric power distribution." He believed Sir Dugald Clerk, in making his remarks, referred to the fact that in the 55 million tons was included a large amount for the heating question. The next reference to the report was one relating to the basis of the estimated saving as being based on 1 lb. per E.H.P. When he referred to the report, he found it was 1½ lbs.; and in the notes which he would send in to the discussion, he would give the proper references to show where these figures might be obtained.

Sir DUGALD CLERK said that in some parts of the report the figure of 1 lb. was taken, and in other it was 1½ lbs. The 55 million tons was turned into horse-power on the basis of 1 lb.

Mr. SPARKS said that in Appendix A of the report, the concluding remarks said: "If this proportion were to be reduced in the proportion of 5 lbs. per H.P.H., to 1½ lbs. per H.P.H., the annual coal consumption for power production would be reduced by 56 million tons." There was one million tons difference between this and the other reference; and there was a 50 p.ct. error in the statement made. On the basis of 1½ lbs. his calculations were that the report indicated that an efficiency of 16 p.ct. would be looked for in electric power stations; and this figure had already been passed.

Sir DUGALD CLERK said it was only 13 p.ct. for 1½ lbs.

Mr. SPARKS said he had worked it out to 16 p.ct. It all depended on how much they took for the motors and how much for loss in distribution. He worked it out at 16 p.ct. This figure of 16 p.ct. had been passed. It was three years ago since the report was written; and the progress made since that time, even working on a very much smaller scale than was hoped for in the future, had been very great. So that there was no need to be under any anxiety that they would be able to reach the savings put forward in the report on the basis of 1½ lbs. of coal per H.P.H. The next matter to which he would like to refer was the question as to the issue between what appeared to be the gas and steam generating station. Electrical engineers were not wedded to any particular source of energy Steam, gas, oil, and water power could be used as the primary source of power to produce electricity, which, after all, was only a convenient means of distributing energy. They would be very glad to use gas-engines, because they would be able straight-away to cut-down the thermal loss—without going into the exact figure—by something like 50 p.ct. Electrical engineers were anxious to use gas either in the form of gas-engines or gas-turbines; but the development that had been made with all the ingenuity of the world had not enabled a suitable prime mover to be devised. He was as anxious as anybody to use gas. They were not wedded to the steam-turbine or any other form of power in order to utilize the wonderful distributing agent, electricity. With regard to gas and the question of power production, it was not comparable in any sense with electricity. It was not available for detail drives in factories. The gas-engine would run at full load or on a big load steadily and efficiently; but it was not sufficiently flexible. They all knew that it could not be used for detail drives; and in order to see that even under exceptional conditions gas could not be used for this purpose, he asked them to turn to Pennsylvania, where they had natural gas. Nature supplied the gas-works—they were thrown in for nothing; and yet they would find in Pennsylvania two of the largest and most prosperous electricity companies in the world supplying motive power. With regard to heating, as in other countries, gas was largely used for this purpose, and would continue to be used. Then, as to the actual thermal efficiencies suggested. In the paper read by Sir Dugald Clerk before the Royal Society of Arts, it was suggested that the ratio of the thermal units of gas, under the conditions stated, was 13·4 to 10·4 in the case of electricity. Sir Dugald suggested a gas-engine which ran at 75 p.ct. load all the time; but when they came to small units of power, this was not an operating condition. Even taking Sir Dugald on his own figures, however, if an electric motor was supplied from a modern electric power station, he was of opinion that the difference, instead of being 30 p.ct. in favour of gas, as was made out thermally, was only 7 p.ct., taking this particular case—*i.e.*, the ratio was 12·8 to 13·6 when the plant was working at this selected load. And 7 p.ct. was really a very small matter, and with the improvements that were in view with regard to thermal efficiencies, even of the steam turbine, the 7 p.ct., if it existed, was going to be wiped-out. Even if the thermal efficiency was against electricity to a much larger extent, the fact that gas was not available for detail driving put it out of the question; so that a direct comparison, even on a thermal basis, was impossible. Coming to lighting, Sir Dugald Clerk had done the electrical industry the honour of suggesting that the efficiency of electric lighting was something like that of gas—viz., gas 1 and electricity 0·821; so that here electricity had a small advantage. He had analyzed the figures, however, and from what he knew of lighting, the advantage was very much more in favour of electricity than that.

Sir DUGALD CLERK: Are there more half-watt lamps than I have assumed?

Mr. SPARKS said he had read Sir Dugald Clerk's paper, and had taken the comparison in the same way. The paper assumed half the number of lamps of a certain size and half of another. He did the same. Sir Dugald Clerk gave gas the credit of half the lamps being inverted mantles and the other half vertical mantles. He had taken half of the number of electric lamps as ordinary metallic filament lamps and the other half as the so-called half-watt lamps; and he found the ratio to be 1 for electricity and 2·15 for gas—*i.e.*, the competition was a very real one in favour of electricity. Electricity was not in competition directly with gas for heating purposes. The competition to replace the open coal-fire was directly between gas and the closed combustion stove. Electricity came into the heating field only for special purposes where high temperatures were required—for chemical purposes and where the infrequent use of heating appliances made its flexibility a convenience, or where low thermal efficiency was offset by the high efficiency of the detailed apparatus. In conclusion, he would here like to say, referring to Sir Dugald Clerk's paper, where he pointed out that the vast field for the use of electricity was realized by gas engineers, that electrical engineers on their side realized that gas had its special field as well. There was room for the fuller development of both these public utilities, and he hoped, as an outcome of this discussion, the two industries would try to co-operate to a greater extent in future than had been the case in the past.

Mr. W. H. PATCHELL thought that too much had been made of the so-called attack on the gas industry. In his paper before the Royal Society of Arts, Sir Dugald Clerk said: "It would be a serious matter for the country if the development of these [gas] engines be hampered in any way. Gas engineers fully realize the existence of a vast field for the generation of light and power by electricity. Electricity supplies energy for power in a convenient form for the operation of electric railways, tramways, small and medium power motors in factories of various kinds. It is also necessary for many electro-chemical purposes, for very high temperature metal melting, and for all electrolytic processes. Its field is very wide; but its use as the one source of heat, light, and power by legislation would be fatal to the prosperity of the country, and would largely increase the fuel consumption already high." This might be the inference from the report; but the report did not come anywhere near saying this. The reports of the Committees on Coal Conservation and kindred subjects aroused the attention of politicians when party politics were taboo. Electricity was to be the cure-all. Rivers of electricity were to wash-away the effects of the war, if not the whole of the national debt. Early in the report, it was stated that "the pre-war earning power or wages of each individual was far too low." This was a very encouraging creed for some people who were very energetic just before the general election. They were honoured that evening by the presence of the first and last signatories to the report of the Coal Conservation Sub-Committee (Messrs. Merz and Sparks); and he believed they would admit that high wages had meant the conservation of energy in another sense than the slogan of the Committee's report. The report said that "existing generating plants were uneconomical, and ought to be scrapped." There was no qualification there. They were all in that category; and the report went on to say "but this cannot be done until more modern plants are available." The cure was to be super-stations to be set up in sixteen areas—not sixteen power stations, as Mr. Merz rightly stated. They were to be set up in sixteen areas; and these were, by the figures in the report, to save 55 million tons of the 80 million tons of coal used by industry. The way the 80 million tons was arrived at was by taking the figure of 70½ million tons given by Mr. Flux in an estimate before the Royal Statistical Society ten years before, and correcting it to 80 millions. Then the report said distinctly that Mr. Flux excluded from his table all the coal used for blast purposes, and also all that was carbonized in gas-works. If the electric supply industry had been as well organized as the gas industry, the electrical undertakers of the United Kingdom would have retained the Clerks, Smithells, and Cobbs of electricity in order to protect their silver shrines. In so far as the 18 or 20 million tons of coal carbonized in gas-works was concerned, therefore, Sir Dugald Clerk, he thought, was barking up the wrong tree. It was primarily the politicians and not the electricians that he should attack, if any one; and there they all ought to make common cause. High wages earned by scrapping existing capital, by the output of super-power stations (paid for as much as possible to the tune of 25 or 45—some people afterwards said 150—millions sterling from the public purse) was an attractive parliamentary cry, especially with the liberal interpretation that it obtained in the House. He submitted that the relative position of the electrical and gas industries was better shown in the recommendation made to the Committee of the House of Lords by the most eminent gas engineer in the country, Dr. Charles Carpenter, a few days ago. He said that, having regard to the competition of electricity, the existing sliding-scale was unnecessary, and ought to be abandoned. He actually craved the electrical industry in aid! The thermal efficiency of gas-works was well known and improving. The thermal efficiency of a modern electricity power station was also well known; and Sir Dugald Clerk knew perfectly well that it was much higher than the average figure given by Mr. David Wilson, which was based on all the stations in the country, old and new, on a low load factor. For the purpose of comparison, Sir Dugald Clerk should have taken 18 or 18½ and not 8½.

Sir DUGALD CLERK: I dispute that, too.

Mr. PATCHELL: Quite. Continuing, he said that they had had circulated a reprint of the paper as read before the Society of Arts. The paper was in full; but there was only an abstract of the discussion, and there were some important figures that had been omitted from the abstract. But he was not concerned with splitting hairs as to the efficient making of gas or electricity. He himself had lately shown before the Institution that gas could be generated at a higher efficiency than Sir Dugald Clerk claimed for town gas. He had also shown that it was economical and convenient in some cases to use gas-furnaces;

but for the transmission and utilization of power over a large works or a scattered area, the high efficiency of the gas-engine at full load was nothing as compared with the all-round efficiency and convenience attached to the use of electric motors. The benefits were just as well known to the gas industry as to other people. Go to any large and up-to-date gas-works, and they would find the management proud of its beauty spot—a gas-driven electric power station. Last week Sir Dugald Clerk was in the chair at the annual meeting of the Institution of Gas Engineers; and it was unfortunate that they did not reach the paper by Mr. Fisher, of Tottenham, on "Electricity Supply by Gas Companies." He would like to read two or three extracts from it, if there was time, because they were worth putting into the Proceedings of the Institution of Electrical Engineers. Mr. Fisher, who, of course, spoke as an "ardent gas man," said:

> "But in spite of this, five years of electricity supply as a part of his work has shown that many people will have electricity for lighting if they can get it, even if it costs more; and he has also been astonished at the eager demand experienced for small motors for trade purposes. These motors are installed in places where gas-engines would be quite unsuitable. They are used by people who could not be trusted to attend to a gas-engine. The small amount of attention and upkeep they require is agreeably surprising.
>
> "First, as to light. Owing to the superior efficiency of electric lamps the writer maintains that there is, from the coal conservation point of view, a decided advantage in using gas to generate electricity, instead of burning it directly to heat an incandescent mantle.
>
> "For power, the comparison must be wholly in favour of gas used direct, rather than for electricity generated by town's gas. Obviously one cannot generate electricity by gas and reconvert it it into power without some loss; but practically there is a great advantage in so doing. It enables a great number of people to use small power units in factories, shops, and even in their homes—in places where a gas-engine would be quite out of the question, and where it would be impossible to maintain the efficiency of such a number of small engines.
>
> "Although on paper the advantage is in favour of gas, the writer is confident that in practice the electric system is to be preferred in all cases where there is not a continuous heavy load all the time."

In his fifth conclusion, Mr. Fisher stated:

> "Last, but not least, the public generally should get the best service. People without technical knowledge would not be rushed into using electrical appliances in cases where gas is in every way better and more economical, and so also there would be no reason to dissuade customers from using electricity where it is obviously the most suitable agent to employ."

In conclusion, he (Mr. Patchell) pleaded for more sanity and clear thinking in each industry. Some people spoke of electricity as if it were a prime mover, and, on the other hand, some people only recognized gas as an enemy. The competition of electricity had been the making of the gas industry, and each could, and would, help on the other. He firmly believed there was room for both; but what he was really anxious about was that each would set its face against the pauperizing of its customers at the expense of either the owners of the respective undertakings or of the State.

Colonel R. E. CROMPTON said he had come to speak in this discussion for two reasons. A large proportion of his livelihood had been earned in managing electrical power stations. He had naturally watched every development; and it was a good many years since he saw the best line was to make friends with the gas companies. He had always been on good terms with them. As a previous speaker had said, Dr. Carpenter was one of the ablest of gas engineers; and though he had taught him more than most others, he was happy to say that he had been able to teach Dr. Carpenter something. He had said a few words at the Society of Arts when Sir Dugald Clerk's paper was read, and he said then that, in the case of the ordinary radiator, on account of its convenience and adaptability, it was actually cheaper and better to use electricity for the heating of a bedroom, where heat was only required occasionally and where the heat was required close up to the bed or to the person. He was not prepared to speak at the time; but he had gone into the matter very carefully, having had the advantage of long discussions with Dr. Carpenter. In view of the fact that it cost him from £38 to £45 per annum for gas to cook the food in his house during the last thirty years, he felt there was something wrong; and he called in Dr. Carpenter's experts to help him to find out where he was wrong. The result was that he did find out where he was wrong. But he also found out where all the gas people were wrong; and he believed he was going to help the gas industry and Sir Dugald Clerk to make progress with the use of gas as a heating medium to an extent that they could hardly appreciate. [Laughter.] Had it occurred to them what a remarkably inefficient operation was the cooking of food? It was inefficient with the coal-fire; but when they used gas, it was appallingly inefficient. Did they know that there was only about 6 p.ct. of the energy in the gas that actually went into the food? That was not a calculated figure; but it was perfectly easy to find out. A certain weight of food had to be raised a certain number of degrees. It was easy to get at the thermal units required, and, on the other hand, they had the gas-meter. Of course, it was said, and it was perfectly true, that it was the very convenient wastefulness of gas by servants that was one of the great causes why it was so expensive. No servant could be taught—at least, he had never found a servant who could be taught—to use gas to advantage. He had a very limited time to speak; and he would give his story in this way. If he had been set right about the cooking side, he found he had nothing to learn from the gas company about the heating of water. He had set about superseding the apparatus he had in his house for heating water. He had done a little thermal storage in his time; and he made out a bill of the proper number of thermal units he would require for the hot water supply of his house—for baths, washing-up water, and so on, in which an enormous waste took place either with coal heating or with gas heating. The waste was nearly all losses in radiation; and he proceeded to do a little of what his friend Mr. Druitt Halpin and himself did years ago—he made a thermal storage gas-heating apparatus, and had shown it to Dr. Carpenter's experts. It was here that the fun came in. He used so little gas to heat 16 gallons a day for water for baths and washing-up that it did not run the meter. [Loud laughter.] Consequently, he was sorry to say that the gas industry had made him positively miserly. In a general way, those who had electricity to sell knew a little about getting a meter to turn round at very low loads; and he had found that the very small beads of gas with which a perfectly lagged vessel could maintain the required temperature did not register on the meter, and only came on to the bill when the meter was being used for other purposes. As a matter of fact, it had not increased his gas bill at all. Theoretically, he ought to use something like 18 c.ft. in 24 hours; but when the heating apparatus alone was in use, there was no registration on the meter. They would find that he had a 97 p.ct. efficiency of his heating apparatus. And here he thought they could say that the gas people had scored by getting an electrical man to help them.

The PRESIDENT said that before calling on Prof. Smithells to speak, he believed Sir Dugald Clerk wished to say something with regard to the Coal Conservation report.

Sir DUGALD CLERK said that Mr. Merz seemed to think that the gas industry had no reason for alarm from the Committee's report. He would like to read one paragraph from the report—viz., section 32, as follows: "The general position and effect of the inauguration of a comprehensive system of electricity supply has been dealt with above, and the magnitude of the problem has been touched upon. It has been shown that the present coal consumption for power purposes alone which would be affected by the change amounts to at least 80 million tons." That was the total coal, and a footnote to the paragraph stated: "The coal consumption which would be affected indirectly is much larger. The coal consumption for domestic purposes, including most of the coal used in gas-works, would be affected by an improvement in the production of electricity; for as the price of electricity fell, so would its use for lighting, heating, and cooking, already very considerable, increase in substitution for the direct use of coal and gas for these purposes." There was a distinct hope there of including large quantities of heating in the uses of electricity. There were some other statements in the report. For instance, in section 13 reference was made to the use of electricity for domestic purposes; and there were others which he had referred to in the James Forrest lecture. His main point was that there was a very distinct intention throughout the report to deal with heat problems as well—not that he objected to it, and he had shown the result if they did. The only reason he had assumed the substitution of gas by electricity was to see what would theoretically be the effect, and what would be the amount of electricity required to perform the same service that gas was now giving. The reason he did not give the reverse was that he did not suppose for a moment that gas was going to displace electricity; and he was very glad to hear that the gas industry was going to be left some room for development. He thanked the meeting for allowing him to open the discussion. It was a great pleasure for him to be among so many friends in the electrical industry, although he differed in some respects from them. He hoped he would be given the opportunity of making a reply in writing because of the late hour. Even if he gave a short reply now at once, it would take twenty minutes. He would therefore prefer to do it in writing.

Prof. SMITHELLS said he only wished to make a few remarks. He had come to listen, and not to speak. He only wished to say how much those who represented the gas industry at the meeting were indebted to the Institution of Electrical Engineers for giving them the invitation to take part in a friendly discussion. It was possible that he might feel disposed to contribute something in writing; but he would not attempt to make a contribution then. He would only say that he thought it was all for the good that the discussion between the two industries had been raised to the level it had reached that evening, rescued from that partizanship which was natural, but which was very dangerous in some respects when the public and the statesmen of the country had to be led in the right direction on a question of great national importance. He hoped that the friendly overtures that had been opened at the meeting in an official way between the two industries would be long continued.

A VOTE OF THANKS.

The PRESIDENT, in proposing a hearty vote of thanks to Sir Dugald Clerk and Professors Smithells and Cobb, said he could not do better than echo what Prof. Smithells had said. It had been a very great pleasure indeed for the Institution to welcome them to the meeting; and he hoped it would not be the last occasion on which they would meet in a friendly discussion of subjects which were of very great importance to both industries. He felt that it was to a certain extent appropriate that he himself should preside at such a meeting, because the first electrical job that he had was as engineer to the Imperial Continental Gas Association in their electrical department.

The vote of thanks was cordially responded to.

An attractive programme has been arranged for the excursion meeting, on Friday, July 9, of the Manchester District Institution of Gas Engineers, under the presidency of Mr. E. H. Hudson, of Normanton. The Committee have accepted, on behalf of the members, the invitation of Mr. John West, J.P., M.Inst.C.E., to visit the Derbyshire Silica Fire-Brick Works at Friden, near Buxton. Members will be conveyed from Manchester to Buxton in motor char-a-bancs, placed at their disposal by the Derbyshire Silica Fire-Brick Company, Ltd., who will also entertain the members at luncheon at the Palace Hotel, Buxton. After luncheon, and the transaction of formal business, the party will proceed in the motor coaches to the Friden Brick-Works, where an inspection of the works will take place and the process of manufacture will be fully explained. Invitations to attend the meeting will be forwarded to the members of the Refractory Materials Committee of the Institution of Gas Engineers.

SOCIETY OF BRITISH GAS INDUSTRIES.

ANNUAL MEETING AT SHEFFIELD.

The Annual Meeting of the Society of British Gas Industries took place last Tuesday, at the Mappin Hall of the University of Sheffield. Sir ARTHUR DUCKHAM, K.C.B. (the President), occupied the chair.

A WELCOME.

Prof. W. RIPPER, C.H.D., Eng., L.P. (Dean of the Faculty of Engineering, Sheffield University), extended a hearty welcome to the members, and expressed gratification that the Society had chosen Sheffield as the place of meeting, and particularly that they had selected the University for the gathering. The present was a very critical time in the history of industry; and the outlook filled them all with a feeling of anxiety. There was looming ahead a time for good work such as never presented itself before in the history of this or any other country. The demand upon every industry was likely to be unprecedented, and particularly so in the industries which were concerned in the practical application of science. He (Dr. Ripper) and Sir Arthur Duckham, prior to the meeting, had been exchanging a few words on the extraordinary advances which had been made in the scientific industries in recent times; but he could not help thinking, in particular, what a remarkable advance had been made in the gas industries, from the days when gas stood only for lighting. If there was any progress to be made in the present day, they must all recognize the urgent necessity for co-operation, and for unity of purpose. It was a great encouragement to those who followed the development of industrial societies, to note how keen and active was the desire to unite for a common purpose—namely, the efficiency and effectiveness of the industry in which they were engaged. It was when they got together and compared the ways and means of facing the difficulties ahead, and when they combined their financial help, that they were able to realize the many necessary developments which none of them could accomplish alone. The University was keenly anxious about the development of industries on the scientific side.

The PRESIDENT thanked Dr. Ripper and the University authorities for their kindness to the Society.

ANNUAL REPORT.

The fourteenth annual report of the Council [for 1919-20] opened by referring with regret to the loss the Society have sustained by the deaths of Mr. Joseph Braddock (J. & J. Braddock), Mr. Thomas C. Newton (Chairman of Newton, Chambers, & Co., Ltd.), Mr. John Barker (General Manager of Henry Balfour & Co., Ltd.), and Mr. J. W. Wallis (Joint Managing-Director of Drakes, Ltd.). Congratulations are offered to the following gentlemen: Sir Henry E. Duke, appointed President of the Admiralty, Probate, and Divorce Division; Sir Robert Hadfield, Bart., elected a Member of the Council of the Royal Society, and of the Institution of Civil Engineers; Mr. Fred. J. West, appointed a Commander of the Order of the British Empire; Mr. Albert Cliff, elected Mayor of Stamford; Mr. George Clark, appointed a Justice of the Peace for Chesterfield.

The following is a brief *résumé* of the work the Society have undertaken during the past year.

We were approached by the Institution of Gas Engineers to give a paper at their annual meeting in June of this year, an invitation much appreciated and cordially accepted. Embracing, as we do, practically the whole of the firms constructing and supplying the various apparatus required in the production, distribution, and consumption of gas, it became necessary to confine the paper to one subject. It was considered that "Carbonization," which takes priority in the actual order of gas manufacture, was a subject to appeal to gas engineers of the present day. Accordingly, the paper was confined to firms in the Retort Section—each firm contributing equal parts in the aggregate to the complete paper. It was necessary to draw-up certain rules to govern the contribution of each individual firm, in order not only to obtain uniformity, but with the object of presenting a treatise to the gas industry dissociated with any semblance of advertisement.

There is no doubt that all the firms have experienced great difficulties in labour questions during the past year. We had hoped that, with the establishment of Industrial Councils and Arbitration Boards, smoother working conditions and better relations between employers and employed would by this time have prevailed. Our President, Sir Arthur Duckham, K.C.B., has chosen this subject for his Presidential Address at the annual meeting; and we look forward to a valuable and interesting contribution on this matter.

The National Gas Council invited the Society to nominate twelve members to serve on a Joint Standing Committee with twelve of theirs, to discuss matters which may arise from time to time; and our representatives have been duly appointed.

Conferences have taken place during the past year between a Committee of the National Gas Council and Committees of Section V. and VI. on the prices of meters and stoves.

The position of the gas-apparatus manufacturers in relation to the Government Housing Scheme has been discussed on several occasions. The Council have co-operated with the British Commercial Gas Association, and have done all they possibly could to put forward the interests of the gas industry as a whole.

Important conferences organized by the British Engineering Standards Association were held early this year, under the Chairmanship of our President, on the subject of pipe-threads, at which we were also represented by a member of the Council. The Paris meeting of the International Commission on Pipe Threads has now been postponed until next year; and in the meanwhile a Sectional Committee of the Association has been formed, with our President as Chairman, to revise Report No. 21 on British Standard Pipe-Threads, and to interchange views with a similar Committee of the American Engineering Standards Committee. It is generally recognized that the question is one of great importance from an industrial, as well as a technical, point of view.

The Society have been represented at the conferences convened by the Public Utilities and Harbours Department of the Board of Trade on the subject of gas standards.

At the request of the News Department of the Foreign Office, through the London Chamber of Commerce, photographs of British gas industries, showing workpeople engaged in their various lines of manufacture, have been supplied by many of our members for the purpose of pictorial propaganda by means of illustrated papers circulating in Russia and the East.

It is gratifying to report that the question of patents taken-out before the war, which was raised at the last annual meeting, has now been settled; the Government having brought in a new Act, under which patents taken-out before the war will be extended, without fees, for a period of two years.

The Society were represented at a conference convened by the Institution of Heating and Ventilating Engineers on the future of their research work at University College, London.

The Joint Committee on the life of Gas-Meters are continuing their investigations. During the past year, the new standard form of guarantee for gas-meters, more suited to present conditions, which was drawn-up by the Committee, has been agreed to and adopted by the National Gas Council. The question of the rating of meters has also been further discussed; and a revised list of sizes and capacities has been drawn-up and approved by the Institution of Gas Engineers.

A very interesting and instructive interim report has been presented by Mr. Taplay, the Chemist to the Joint Committee, on the result of his examination of deposits found in main and service pipes, and confirms the conclusions arrived at in the previous reports—namely, that cyanogen compounds are responsible for a large proportion of meter troubles. This appeared in the report of the work of the Joint Committee presented at the annual meeting of the Institution of Gas Engineers. It is felt that the work of this Committee has already indicated the directions in which relief may be sought from the destructive action of present-day gas on meters and other apparatus. As the work proceeds, further valuable information will be obtained.

The Committee have already taken-up the question of a revision of the Sales of Gas Act, which has become entirely obsolete in relation to modern conditions. The matter is now under discussion between the representatives of this Committee and the Association of Statutory Inspectors of Gas-Meters.

A deputation of Section VII. had an important meeting at the Board of Trade during the year in regard to the importation of glass, mantles, lamps, and burners; and certain proposals were made as a basis for legislation, having for their object the prevention of unfair trading by the Central Powers. With regard to the importation of glass and mantles, the Board of Trade have decided to look after these articles so far as British interests are concerned; and they have promised that the question of burners and lamps shall be carefully considered.

The Refractory Materials Joint Committee are continuing their investigations; and the following matters have been dealt with: Casting of gas-retorts; some comparative tests of machine-made and hand-made silica bricks; and the specific heats of refractory materials at high temperatures. A further contribution of £150 was made, which, in conjunction with an equal amount subscribed by the Institution of Gas Engineers, has enabled the Government grant of £300 to be obtained.

The Council have recently appointed Messrs. Blyth, Dutton, Hartley, and Blyth as Parliamentary Agents to the Society, to watch Bills promoted by gas authorities with a view of safeguarding the interests of our members.

The Society have recently joined the Federation of British Industries, which we believe will be of great benefit to the Society; and under the new scale of subscriptions our members who are also members of the Federation will receive a rebate of 25 p.ct. on their subscriptions. As a number of our members already so belong, this will be a decided advantage to them, and will also apply to other members who join.

In view of the growth of the Society and its increased work, and the support required from time to time for research work in connection with the gas industry, the Council have decided to recommend to the members at the annual general meeting that the entrance fee be increased to five guineas and the annual subscription to ten guineas.

The Society's prizes in connection with the City and Guilds of London Institute examinations in "Gas Engineering," "Gas Supply," "Gas Fitting," and "Coke and Bye-Products Manufacture" have been awarded and duly announced in the Technical Press. The prizes in the examinations in "Coke and Bye-Products Manufacture" will in future be given by the Coke-Oven Managers' Association at their special request; and consequently we have increased the first prizes in "Gas Engineering," "Gas Supply," and "Gas-Fitting" from three guineas to five guineas.

Another matter which has received the attention of the Council, and was referred to at the half-yearly meeting held in October last, was the re-arrangement of the sections. This is a reconstruction which cannot be lightly settled without full and proper consideration. Difficulties arose, in that certain sections did not altogether approve of being linked-up with other sections; and until unanimous approval on the part of all those interested is obtained, not much progress can be made with the proposal.

The Society wish to accord their best thanks to Sir Arthur Duckham, K.C.B., for his valuable services as President, and are much gratified that he has consented to occupy the Presidential Chair for another year. The Society desire to place on record their best thanks to

Mr. Samuel Cutler, Junr., Assoc.M.Inst.C.E., for his paper, entitled the "Question of Trading with the Central Powers," at the autumn meeting, which led to a good discussion.

(Signed) SAML. CUTLER, JUN.,
Chairman.

Mr. SAMUEL CUTLER, JUN., who moved the adoption of the report, said there should be added to the list of those to whom the congratulations of the Society were offered the names of Sir Dugald Clerk, on whom had been conferred the honour of Doctor of Law of St. Andrew's University, Lord Moulton, who had been honoured for his many services during and since the war, and Mr. A. W. Glover, who had received a distinguished Belgian Honour in recognition of services in connection with the organization of hospitality for Belgian refugees. In regard to the paper which the Society were to hear that day from Sir Arthur Duckham, he felt, after having the privilege of seeing it in advance, that it would rank as a standard work of reference on all matters relating to the solution of the labour problem in this country. Dr. Ripper had referred to the need for co-operation among societies. He (Mr. Cutler) was sure the Society of British Gas Industries extended its hand to the Institution of Gas Engineers, the British Commercial Gas Association, and all other societies connected with the gas industry. He was sorry they had not yet had opportunity of putting this invitation into great practical effect; but the Society were only too willing to co-operate with other bodies whenever occasion arose. The report showed they had endeavoured to accomplish a good deal of work. One item which required serious attention was the re-organization of the sections; but he quite understood this was a matter which could not be finally settled that day. The proposal met with the entire approval of the President; and he (Mr. Cutler) hoped it would receive careful consideration by the members of the sections. What was needed was to reduce the number of sections, and get larger sections and a larger amount of interest and work. He hoped the retort-setters and the fire-brick manufacturers would shortly come together, and show an example to other sections.

Mr. B. B. WALLER (Hon. Secretary), in seconding, said the position he held as Hon. Secretary was a sinecure; but it afforded him an opportunity of attending the meetings of the Council. One point he would emphasize in particular was the difficult task the Chairman had in organizing the paper to be given before the Institution of Gas Engineers. It involved a great amount of work, tact, and discretion, because it was not the work entirely of one man, but the pooled ideas of a number of people, and it had to be presented in a form which would do every credit to the Society. This difficult duty was carried out in such a manner that the paper did do the Society the credit demanded.

The report was adopted.

Mr. JAMES W. WILSON moved the adoption of the financial statement for 1919.

Mr. CHARLES CLARE, seconding, asked whether the grant for research in refractory materials was to be continued?

Mr. WILSON: That at the present moment is under the consideration of the Council.

The PRESIDENT said it seemed to him this matter of grants needed some co-ordination. There were two or three different bodies to whom the Society sent money; and it all went eventually to the same place. There ought to be only one place to which the money should be sent. He thought he could promise that steps to this end would be taken, so that the Society's money would go in as a whole, and not in parts.

The financial statement was adopted.

ALTERATIONS OF RULES.

Mr. CUTLER proposed an alteration of Rule 7, so that the entrance fee be five guineas and the annual subscription ten guineas, in place of the existing three and five guineas respectively. He said it would be obvious to all the members that, in the present circumstances, the Society must have more money. They had not a great deal in hand.

Mr. R. J. MILBOURNE seconded, and said they had to recognize that everything had increased in price.

The proposition was carried unanimously.

Mr. CUTLER moved an addition to Rule 11 that, "in the event of the Chairman of a Section failing to attend four Council meetings during his year of office, except for causes which in the opinion of the Council are reasonable, he shall not be eligible for re-election." After mature consideration, the Council decided upon this recommendation in the interests of the Society.

Mr. MILBOURNE, seconding, said members were aware that practically the whole of the business was transacted in the Council, and that with the separate sections they had it was very difficult to get all the members of the Society together.

The PRESIDENT said he would take the opportunity of strongly recommending this alteration. The Society could not go forward unless the Council comprised "live" men.

The proposition was carried unanimously.

On the proposition of Mr. CUTLER the meeting amended Rule 15, to read that the annual meeting should take place, if possible, in May, instead of March; so that more provincial meetings could be held, and they would have better weather.

ELECTION OF OFFICERS.

The PRESIDENT announced the names of gentlemen elected on the Council as representing sections. [These are set out subsequently in the complete list of office-holders.]

Mr. CUTLER proposed the election of Mr. Cyril G. Davis as Chairman of the Council for the coming twelve months. They all knew Mr. Davis, and he knew them all. For many years he had taken very great interest in the welfare of the Society, and would undoubtedly prove an excellent Chairman. He wished Mr. Davis every success, and promised him any assistance that his own past experience could provide.

Mr. H. M. THORNTON, seconding, said he had watched with the greatest interest the work of Mr. Davis as Vice-Chairman.

The proposition was carried unanimously.

Mr. DAVIS, in response, said he fully realized how important it was that whoever occupied the chair of the Society should put his level best into the work. He followed an excellent Chairman, and would have the support of a President who was actually one of themselves, and more keenly alive to the work of the Society than probably any President they had had.

Mr. DAVIS proposed the election of Mr. Frederick G. Cockey as Vice-Chairman of the Council. He said Mr. Cockey had been associated with the Council for many years, and had shown marked ability in dealing with affairs.

Mr. A. W. GLOVER seconded the motion, which was carried.

Mr. COCKEY, in responding, said he would give the new Chairman all the support in his power. Work for the Society was not only a labour of love, but a liberal education for those who took part in it.

Mr. F. J. GOULD moved, and Mr. J. WINSON SCOTT seconded, the re-electoin of Mr. F. C. TILLEY as Hon. Treasurer. The proposition was carried.

On the motion of Mr. CLARE, seconded by Mr. H. J. DONKIN, Mr. B. B. Waller was re-elected Hon. Secretary.

On the motion of Mr. GEORGE CLARK, seconded by Mr. F. G. COCKEY, Mr. Samuel Cutler, Jun., was adopted an elective member of the Council; and on the motion of Mr. C. S. BENNETT, seconded by Mr. THOMAS GLOVER, Messrs. Percy F. Holmes and Archibald P. Main were re-appointed as elective members of the Council. Messrs. Cash, Stone, & Co., were re-elected Auditors.

LIST OF OFFICERS.

The completed list of office-bearers is, therefore, as follows:

President.—Sir ARTHUR DUCKHAM, K.C.B.

Vice-Presidents.—Sir DUGALD CLERK, K.B.E., F.R.S., CHARLES CLARE, J. H. BALFOUR BROWNE, K.C., D.L., Prof. ARTHUR SMITHELLS, C.M.G., F.R.S., Prof. HAROLD B. DIXON, C.B.E., Ph.D., F.R.S., Surgeon-General Sir ALFRED KEOGH, G.C.B., C.H., G.C.V.O., the Right Hon. Sir HENRY E. DUKE, Sir ROBERT A. HADFIELD, Bart., F.R.S., and the Right Hon. Lord MOULTON, K.C.B., G.B.E., F.R.S.

COUNCIL.

Chairman.—CYRIL G. DAVIS, M.I.Mech.E.

Vice-Chairman.—FREDERICK G. COCKEY.

CHARLES S. BENNETT	Representing Section		I.
T. V. MILES	,,	,,	II.
FRED J. WEST, C.B.E.	,,	,,	III.
R. J. MILBOURNE, F.C.S., A.M.Inst.C.E.	,,	,,	IV.
ALBERT W. GLOVER	,,	,,	V.
CHARLES CLARE	,,	,,	VI.
J. BRIDGER	,,	,,	VII.
T. E. UPJOHN	,,	,,	VIII.
JOSEPH J. CARTER	,,	,,	IX.
ALBERT CLIFF	,,	,,	X.
GEORGE CLARKE, J.P., M.I.Mech.E.	,,	,,	XI.
J. WINSON SCOTT	,,	,,	XII.

Elective Members.—PERCY F. HOLMES, J.P., M.I.Mech.E., ARCHIBALD P. MAIN, SAMUEL CUTLER, JUNR., A.M.Inst.C.E.

Ex-Officio Members.—B. B. WALLER, A.M.Inst.C.E, *Hon. Secretary*; F. C. TILLEY, M.I.Mech.E., *Hon. Treasurer*.

Secretary.—ARTHUR L. GRIFFITH, 46, Queen Victoria Street, E.C.

A vote of thanks was awarded to the retiring officers.

The SECRETARY (Mr. Arthur L. Griffith) reported the receipt of a number of letters of apology for absence.

PRESENTATION TO MR. CYRIL DAVIS.

The PRESIDENT handed to Mr. Cyril G. Davis a handsome wristlet watch, as a small recognition of his great services in organizing the social side of the Society's activities—especially on the golf course.

Mr. DAVIS, in expressing his thanks, said the gift was a complete surprise. Whatever he had done had been done for the sake of the Society, whether on the business side or socially.

LABOUR'S POSITION IN INDUSTRY.

Sir ARTHUR DUCKHAM then read an address on "Labour's Position in Industry." This, and the subsequent discussion, will be found on pp. 786-88. The President said that when he had been asked to read a Presidential Address, he had stipulated that it should be open to discussion. It always seemed to him to be a pity that such addresses were not subject to discussion.

THE ANNUAL DINNER.

In the evening, the members gathered at the annual dinner, in the Royal Victoria Hotel—under the chairmanship of the PRESIDENT.

The "Loyal Toast" having been given,

Mr. A. M. JACK (Managing-Director of Messrs. Hadfields, Ltd.) proposed "The Society of British Gas Industries." He remarked that it had been said that the great war—the memory of which would last

for ever—had been won by steel. Undoubtedly, this was true; but what produced the steel, if not gas? The gas producers were responsible for the steel, and the gas appliance manufacturers—the members of the Society—were responsible for the gas. It looked, therefore, as if the laurel must go to the gas and gas-appliance people. If we were to live as a nation, we must support our own industries. Without any support of British industries, the third word of the title of the Society was nothing. The country had flourished by these industries; and if the industry did not flourish, the country would not flourish, and the name "British" would become a by-word, and not a reality as it was to-day. He therefore wished every success to all branches of the gas industry, and to the Society of British Gas Industries. May the Society go forward, and bring down the price of gas.

The PRESIDENT, responding, said he had recently been speaking to an American friend as to hopes of the future in the gas industry, and in the work of the Society. The American had said, "All this is impossible as yet in America. I have tried to bring the people in the contracting part of the gas industry together; but I have the greatest difficulty in getting them even to shake hands with each other." Sir Arthur said he felt proud to be the President of the Society. He believed he was the first President they had had who was actually out of their own body; and he might therefore be better able to speak with the spirit of the industry than his predecessors. The Society had a definite purpose, and that was to assist the industry, to benefit each other, and to increase the use of gas. This was the groundwork of the great benefits for which they must work, for the country at large. Though they must have co-operation with other sections of the industry, they must first look to themselves, and make their own Society a still stronger unit. He felt strongly that they did not all give the thought and care to the Society's work which they ought to do. They should have better meetings during the year, and get more support for the Council from the general membership. It was rather absurd when they thought of about six large bodies in the gas industry as separate units, when they ought to be one great unit first and sectionized afterwards. If the others would not make the start, let the Society of British Gas Industries try to do it for the sake of the industry as a whole. Look where they were in industry generally. They had the wealthy and wonderful Federation of British Industries. Did the Federation wield a proper weight in the political world, which, under present conditions, was the only world which governed industry? Practically none. There were too many societies and federations, all doing a little bit of very good work here and there, but not doing together what they could do if they were one. Dr. Ripper had brought the cutlery industry of Sheffield together, and had done a great work thereby. They must sink their individuality for the good of the whole, and throw their whole personality into the great united effort. He was present at a concert, recently, at which 4000 people gathered to hear music. If 4000 people in the gas industry gathered for one object, nothing could stop the achievement of that object. They could not become prosperous individually unless the country at large was prosperous; and he did suggest that greater support should be given to their own Society in the first instance, so that, for the good of the country they could ultimately strengthen the whole industry.

Mr. SAMUEL CUTLER, Jun., proposing "The City of Sheffield," coupling with it the name of the Lord Mayor (Councillor Samuel Roberts, J.P.), said the part Sheffield had played in the successful prosecution of the war was well known to every Britisher, but particularly to those associated with the iron and steel industries and the industries which served these industries. Probably no city had supplied more in the way of materials and munitions, in addition to a patriotic sacrifice of men. There were in Sheffield many firms whose names were household words throughout the country. They were old-established, but they had marched with the times and were thoroughly up to date.

The LORD MAYOR, responding, said it was true that great things had been done in Sheffield during the war. It was difficult to connect the Sheffield Corporation with gas, because they did not own the local gas undertaking; but the Company who supplied the gas for the city served them very well. The Company had, he believed, one of the most disinterested Boards of Directors he knew. For many months they had been doing their work patriotically, without any fees. From what he heard from manufacturers the price of electricity, supplied by the Corporation, was going to be so very much advanced that gas would have absolutely free play. If the manufacturers were right in suggesting that the price of electricity would be a burden they could not bear, then gas would have a great chance to prove its value in industry. He expressed his keen regret that he had been unable to give the Society a civic welcome in the Town Hall; but they had come to the city on a day on which the Town Hall was being used for a big conference of municipal officials.

Mr. H. M. THORNTON, proposing "The University of Sheffield," in the absence of Prof. H. Dixon, said the members greatly appreciated the welcome given them that day by Dr. Ripper. The Sheffield University had, he believed, the finest metallurgical department in any university in the world. Where British industry had failed in the past had been in the lack of trained intelligence, and institutions like the Sheffield University ensured that this training should not be lacking in the future.

Dr. RIPPER, in response, said the Sheffield University, from the very beginning, had felt itself in close touch with the industry of the city. They had laid their plans to be of service in this way. There was a great deal more to be done in the future. The future of industry and of the country demanded more from the Universities, from industry, and from the young men themselves than had ever been given before. The students at their University were serious workers; and he would say to the manufacturers that there had never in the past been such a chance to get well-trained young men as there would be after next year. The Department of Metallurgy in the Sheffield University had distinguished itself; and now a great deal of attention was being given, especially by Prof. Fearnsides, to research into the subject of refractories. The people requiring to use these materials were affording valuable help. He referred to the lamented death of Prof. O'Shea, who had been building-up an excellent new Department of Fuel Technology—a work which was to be carried on. There were great possibilities in this subject for Sheffield, and great interests involved; and the University were searching for a man who could properly fill the Chair of Fuel Technology. Nobody knew better than those present that evening how great a need there was for such a department. As an engineer himself, he had been all his life studying how to economize fuel in the generation of power. Everybody interested in fuel to-day knew that there was huge waste going on which could be saved by care and investigation, and by the application of science.

Councillor GEORGE CLARK (Chesterfield) proposed "Kindred Institutions," and referred to what might be called the Triple Alliance in the gas industry—the Institution of Gas Engineers, the British Commercial Gas Association, and the National Gas Council. He hoped they could soon speak of the Quadruple Alliance, and include the Society of British Gas Industries. He entirely agreed that they should have one great central body, with sub-branches, each doing its own work in its own way, but under the one leadership and unity of purpose. The Society of British Gas Industries had a very real part in the gas industry. The gas plant manufacturers held that they were part and parcel of the gas industry.

The PRESIDENT said Sir William Jones would reply to the toast, in the absence of Mr. C. S. Shapley, or representatives of the Institution of Gas Engineers. Sir William would speak as the head of the Ceramic Society, without whose help the industry would be in a poor way indeed. At the bottom of most of their troubles in the manufacture of plant were refractories, more than anything else.

Sir WILLIAM JONES, replying to the toast, said the text of the day had been "Unity of Interest." In these circumstances, he felt he was well able to acknowledge the toast. The many different societies occupied a great deal of the time of members of the industry, who found it necessary to belong to several of them. The complexity of life to-day prohibited anybody desirous of progress from being dissociated from kindred workers, and the same thing applied to kindred societies. There should be a community of interest put into tangible form between the societies. The activity of this Society showed the community of interest between manufacturers of plant. The Ceramic Society had interests which must affect, more or less directly, every producer of gas apparatus. The British Refractories Association, which the Ceramic Society had been prominent in forming, must again interest kindred associations. As one of the pioneers in the movement he was very hopeful that the Society of British Gas Industries and the Institution of Gas Engineers would transfer the funds they had hitherto devoted to refractory research to the British Refractories Association.

Mr. CYRIL G. DAVIS proposed "The Visitors," which toast was responded to by Alderman SAMUEL OSBORNE, J.P. (Sheffield), who said individuals and institutions were to-day largely judged by the share they had in the late war; and in this regard the Society of British Gas Industries certainly held an honourable place. Not least did their President, Sir Arthur Duckham, stand high in the opinion of a grateful nation. [Applause.] Though the Sheffield Gas Company was not a Corporation undertaking, it stood high in their estimation, and had looked well after the interests of gas users in the city. They must all remember with gratitude the pioneer work done by men connected with the gas industry in the endeavour to solve labour problems, from the day when George Livesey did so much in the Metropolitan gas industry, to the great work of Sir Arthur Duckham to-day. [Applause.]

The MAYOR OF CHESTERFIELD also responded.

VISITS TO WORKS.

On Wednesday, the members were invited to inspect two of Sheffield's world-famous industrial establishments. In the morning, Messrs. Walker and Hall's silver, electro-plate, and cutlery works and show-rooms were visited. It is the largest establishment of its kind in the world, employs 2000 hands, and is one of the show-places of Sheffield. For more than an hour, the visitors were occupied in walking through the numerous departments. They were greatly interested to see in operation the various processes through which the beautiful and costly productions of the firm pass, from the designer's studio and modelling room to the finished article in the show-room.

One feature of the works was naturally of special interest to the visitors—namely, the extensive use of town gas in the different operations. Messrs. Walker and Hall, having satisfied themselves that gaseous fuel is superior to solid fuel for the silver and cutlery trades, have displaced the old-time solid-fuel hearths, and substituted the cleanly and easily controlled gas-fired furnace for the various heat processes required. They now employ gas-furnaces for annealing spoons, forks, and all kinds of hollow ware, and blanks for stamping, in nickel silver and sterling silver. For moulding and melting soft metals, gas-fired furnaces are solely used; and likewise for casting handles, spouts, mounts, &c., for tea and coffee pots, sugar basins, and similar articles in Britannia metal. For brazing nickel silver and sterling silver, blow-pipes using gas at low pressure with an air-blast are employed. On the cutlery side, gas-fired forging furnaces are in use for heating blade blanks rapidly to a forging temperature. There are separate furnaces for each heating process. For example, when manufacturing table blades there are four furnaces for as many separate processes; and the average output of a battery of four such furnaces is approximately 100 gross per week of 47 hours. Town gas is also used for heating the vitriol vats for cleaning and pickling.

The afternoon was spent at the East Hecla works of Messrs. Hadfields, Ltd. Here, by invitation of Sir Robert Hadfield, the visitors were entertained to luncheon, which was presided over (in the absence of Sir Robert himself, who wrote expressing his regret at being unable to be present) by Mr. A. M. Jack, the Deputy-Chairman. After the Loyal Toast had been duly honoured, Mr. P. B. Brown (Managing-Director) proposed "Our Guests," and in so doing gave some particulars of the operations of the firm during the war and since. What more especially interested his hearers was a statement of the enormous quantity of town gas which was

employed in the various industrial operations introduced to meet the special requirements caused by the war. Thus, in 1917, the firm's consumption reached the enormous total of 337 millions; and owing to the serious straits the Sheffield Gas Company were in, at that time, to cope with the augmented demand, Messrs. Hadfield's were compelled, in common with many other large gas consumers, to instal boosters in order to secure for themselves a sufficient pressure of gas from the depleted mains. It was instructive to learn, however—and the fact should be taken to heart by all those who doubt the wisdom of a policy which would supply a much lower quality of gas than obtains at present—that, notwithstanding the very low quality of gas which on occasions was supplied, the workmen were always able to adjust the furnaces so as to derive a satisfactory efficiency from the gas. Indeed, it was deficiency of pressure rather than of quality from which they had suffered. Unfortunately, with peace time conditions the firm had had to cut-down their consumption of town gas very considerably, and were using in its place producer gas, which was very much cheaper.

Luncheon over, a tour of the extensive works was made; and when it is mentioned that the combined area of the Hecla and East Hecla works is over 200 acres, and that in peace time between 5000 and 6000 men are employed, it will be recognized that there was very much of interest and importance for the visitors to see and take note of.

LABOUR'S POSITION IN INDUSTRY.

[An Address delivered by Sir Arthur Duckham, K.C.B., before the Society of British Gas Industries, June 15]

Gentlemen,—I have chosen this subject for my address to you because the situation in the industrial world is without precedent, and, being entirely artificial, cannot continue or form the basis of an economic and human settlement of our industrial problems.

We all realize the difficulties and dangers of the present state of things. We can readily point out how impossible the industrial position is becoming, and from our personal experiences give instances to prove our contentions. But I, for one, had not until now sat down to consider how industry can be put on a proper basis—that is, a basis which attempts properly to apportion the benefits derived from industry between the brain worker, the manual worker, the consumer, and the capital employed.

I lay before you my thoughts, and shall much appreciate your criticism.

Why is the industrial position becoming impossible? There is one fundamental reason. The majority of people—financiers, employers, employees—are out to get a maximum return for a minimum of effort.

Wealth is the product of work by brain or hand. Money is the measure of wealth. Anyone, from millionaire to the poorest workman, who obtains wealth without truly producing it, either raises the price of the commodity, impoverishes someone else, or lowers the value of the currency.

To-day the economic situation is fictitious. By taxation, by loans, by every means in their power, Governments have realized their assets, and called in their countries' wealth to meet the rapacious demands of war. These colossal sums have been spent—let loose as it were among the myriads of mankind—and each of us, according to his power, and assisted by demand far exceeding supply, is endeavouring to acquire and hold as much of the booty as possible—the financier by the power of his money, the merchant by his control of the market, the workman by the strength of his union.

In endeavouring to realize the existing state of industry, to set out an ideal, and to make practical proposals for advancement from the present to the ideal, so many problems arise, so many pertinent facts become apparent, that it is not possible to include them all in the scope of an address. I can only put before you a few salient points on the labour position in industry.

What briefly are our specific difficulties in industry to-day? Colloquially, "We don't know where we are." Higher wages demands were first based on the increased cost of living; but now less obvious reasons are advanced for claiming higher rates of pay. The miners are asking for an advance in wages because the price of coal has been increased. The railwaymen give as a reason for their demands that the dockers have obtained a flat-rate of 16s. per day. Trade Unions in general claim that the employee should, by increased wages, be given a larger share in the profits earned by industry. Wage increases are not granted or won on a national basis, or with any consideration of the general industrial position of the other workers, but sectionally, district by district, union by union. The building operatives in the Liverpool area force a local advance of 4d. an hour (2s. to 2s. 4d.). Immediately a demand is made in other large towns for 3s. Men will not work in Manchester at 2s. while wages for similar work in Liverpool are 2s. 4d. Labourers in one industrial section are earning more than the mechanics in another industrial section; and yet both may be employed in the same works or on the same job.

Similarly, the hours of work for differing classes of men may vary on the same job—44 hours for bricklayers, 47 hours for engineers. Some may work overtime; others not. Some overtime is paid for at 1¼ ordinary time; some at 1½.

Working hours have been properly decreased; higher wages have been properly paid to meet the higher cost of living. But the chief argument of the labour party—that shorter hours would mean a higher output per hour—has been entirely refuted. The output per man per hour, instead of increasing, has decreased amazingly, even though the time curtailed has usually been those unproductive pre-breakfast hours. I was able to make a fair comparison in output between 1914 and 1919; and I found that the output per man-hour in 1919 was about 70 per cent. of the 1914 figure. I believe to-day that things are still worse, and that the output would be found to be not more than 60 per cent. of the 1914 figure.

The general labour view is that capital has exploited labour, and that the interests of capital and labour must always be opposed. Unions and Federations of Labour have as their first object the fighting of what they term capital interests. The general industrial prosperity of the country is not considered.

Has labour any justification for the line it has taken up? I think so. Employers have looked upon labour as an instrument for increasing their profits. The greater the production obtained for the money laid out in wages, the greater the benefit to the employer or the owner of capital. Labour has been exploited, and the problem of the worker as a human being apart from that as a producer has not been generally considered. Just as the efficiency of a machine is studied and improved by attention to lubrication, running conditions, economic speed of working, &c., so have the conditions of workers been studied in order to obtain more efficient working, and a higher return on the wages expended and the capital invested.

To-day the controller of an industrial undertaking is working in a maelstrom of difficulties. The pressing demands of the consumer, the difficulty of getting raw material, the ever-impending and irresponsible demands of labour, the crippling effect of industrial taxation, the almost hopeless position of transport, the irksomeness of Government control, and the resultant uneconomic price of the commodity produced, make him almost despair of pulling through and getting industry on to a proper footing.

These are a few of the industrial difficulties existing. How can they be met and overcome? I have tried to free myself from all prejudices, and to consider what the ideals should be for each interest concerned in industry, bearing always in mind that the commercial prosperity of the country must be safeguarded, and improved.

As a worker, my ideal would be:

(*a*) To be treated as a human being and not as a machine.
(*b*) To have to work for such hours, and to such a degree, that I have leisure time for home life, recreation, &c., and sufficient energy at the close of my work to enjoy it.
(*c*) To receive a proper return for the actual work I do, and to receive my proportion of the benefit earned by the co-ordinated effort of all interests concerned.
(*d*) To have an opportunity of advancing and bettering my position, and not to be restricted to the same scale of output as my less keen or skilful fellow-worker.
(*e*) To know for what purpose I am working, and to have some voice in the control of my working conditions and the undertaking in which I am employed.
(*f*) To be able to make proper provision against unemployment for myself, and against sickness and old age for my wife and myself.
(*g*) To be able to bring up my family properly, in order that they may be better citizens than their parents.
(*h*) To have as free a market as possible for my labour.

As an employer (apart from a capitalist) my ideal would be:

(*a*) To turn out a good and ever-improving commodity at an economic price, in order to satisfy consumers and increase demand.
(*b*) To be free of labour troubles, and to know I had the full co-operation of all concerned in my undertaking.
(*c*) To be able to obtain the advice and assistance of my employees.
(*d*) To show at the end of each year an increasingly prosperous business, benefit to all concerned, and a reduction of dead-charges in proportion to the output.

As a capitalist or provider of money pure and simple, my ideal would be:

(*a*) To ensure that my capital (which represents my savings out of earnings) is safe.
(*b*) To ensure that I am receiving a proper return on it, commensurate to any risk I may be running by investing it in industry.

Gentlemen, after formulating these ideals I felt "real good" as the Americans say; and it was a horrible wrench to come back from an idealist's dream to the hard facts of to-day, and to try and indicate some of the steps which might be taken to reach these ideals.

The fundamental need is to arrive at some scheme by which the interests of all parties concerned in industry are co-ordinated, and made dependent on the effort of all jointly and individually. I see no future possible for industry under the present system of opposing camps of workers' unions and employers' federations, recruited and disciplined for the sole purpose of fighting each other for the wealth created by industry, with the Government standing by as an arbiter ready to step in when it becomes apparent that the general well-being of the State is endangered—

the action of the Government taking the form of some palliative or expedient to stop the process of annihilation temporarily.

I see no sound future for industry founded on the proposals of the trade unions and the socialists. Nationalization, syndicalism, guild socialism, all are open to one fundamental objection. Human nature must be changed before such schemes can prove successful. Unselfishness will have to be the attribute of the many, instead of the eccentricity of the few.

I believe Home Rule for industry is the only solution. Industry must control industry. The basis of any successful scheme under present conditions must be that the self-interest of each is harnessed to form a force which will work for the benefit of all. I put forward the following as a brief outline of the steps which might be taken to achieve this end.

The Government should call a council of representatives of employers' federations and workers' unions. This council should first be asked to accept the principle of setting-up a Parliament of Industry, composed of the duly elected representatives of the various interests. The principle being approved, the next step would be to agree the size, composition, method of election, &c., of the new body. The work of the first council would then be concluded, and the Government would cause the first Industrial Parliament to be elected.

The first work of the elected body would be to agree how the chairman or chairmen should be appointed, to lay-down procedure, and to decide the immediate scope of the Parliament's work and authority. The authority of the Industrial Parliament should be as wide as possible, provided the well-being of the State is not endangered, and provided the liberty of the individual is safeguarded. To obtain a truly representative body, all workers and all employers must be brought within the fold of unions of workers or federations of employers, and the ballot must be secret. The size of the Industrial Parliament must not be unwieldy; and, though it would be necessary to sit practically continuously in the earlier days, the sittings should later be so arranged as to allow members time to keep in touch with their industry and to follow their own avocations.

Among the problems that would have to be tackled immediately would be the following:

A. *The Problem of the Vicious Circle.*—Higher wages are demanded to meet the higher cost of living. Higher wages being granted, the cost of production and the price of commodities is increased. It is generally agreed that wages should increase in proportion to the cost of living. At present the increases are only obtained by industrial pressure and the threat of strikes. My solution of this problem is that all workers should receive a subsistence rate as well as a wage. The subsistence rate should approximate to the cost of providing the necessities of life to a worker and (say) three dependants. This rate would be fixed for areas in accordance with the cost of living in such areas; and it should vary automatically with the statistical returns of the cost of living—variations in the rate being made (say) every three months. The subsistence rates should be the same for each class of worker in the area. In addition to the subsistence rates, all workers would receive a wage rate; and this wage rate would vary in accordance with the grade of the worker. All workers of the same class would receive the standard hourly wage rate in whatever industry or part of the country they might be occupied. Thus a blacksmith working in London, Luton, or Land's End, whether in a shipyard, gas-works, or builder's yard, would get the same wage per hour—his subsistence rate only varying. The Industrial Parliament, or a specially appointed Committee, would settle the grades under which the various workers would come, and also the scale of rates for the different grades.

B. *The Problem of How to Give the Workers a Definite Voice in the Control of Industry.*—To solve this I would suggest that in every concern works committees be set up, with definite responsibilities. The method of election and other details would have to be settled in each case; but, from my experience, representatives of different grades of workers, the staff, and the management should be elected by ballot or appropriately appointed. Works' conditions, improved methods, distribution of benefits, safety and welfare, &c., should be dealt with by this committee. Recommendations affecting the general policy of the industry would have to be submitted to the board of directors for approval.

C. *The Problem of How to Give all Interests (Capital, Management, and the Manual Worker) a Voice in the Direction of an Industrial Concern.*—The worker's capital is his power of production; and it must be recognized that he invests this in industry when he is employed in it. It is certainly advantageous to have the benefit of the knowledge and experience of the actual worker on a board of directors; and it is right that the worker should have knowledge of how an industry is conducted and a say as to how it should be run. I therefore suggest that the workmen should have a representative or representatives on the board of directors. The member of staff or workmen directors would have to be settled individually in each industrial unit. They would have to be elected by ballot and approved in general meeting as is the usual practice. Properly elected works committees, together with staff and workmen directors, would do much to eradicate the feelings of mistrust and suspicion that exist to-day between employers and employees.

D. *The Problem of Dealing with Trade Disputes.*—The main lines on which industry is to be run would be laid-down by the Industrial Parliament. The difficulties arising in the various units would be settled by the works committee and board of directors. But no local ruling which would affect district, sectional, or national policy must be put into force unless it is referred to the local, sectional, or national body, as the case may be. The various industrial bodies, local and district, would be built-up on the lines of the Whitley Councils, and the existing machinery would be used as far as possible.

E. *How can Benefits be Shared?*—As already pointed out, the worker would be entitled to receive a subsistence rate, varying with the cost of living in the district in which he works, and a standard wage fixed in accordance with his grade. This wage can and should be augmented by a system of payment by results. Piece-work rates, premium bonuses, tonnage rates, are all methods which suit varying industries; and the council of an industry should first consider the most suitable method of rewarding skill and application as applied in a special industry; and then the works committee should be left to select or modify the system, and render it suitable to their individual case. Such benefits would accrue weekly, and would be a definite wage; the worker always being safeguarded by the standard minimum.

F. *The Problem of How the Benefits Earned by the Industry in General over the Yearly or Half-Yearly Period are to be Divided Among the Interests Concerned.*—It is not possible to lay-down a sound and workable scheme of profit-sharing which is applicable to all and every concern. Conditions vary so widely that only the general lines can be outlined here. The first charge on industry is the weekly or monthly payment to the worker. The worker invests his capital—that is his potential value as a producer—in the business, and receives a return or dividend in the form of wages. Next the capitalist, large or small, invests his money; and the next call on the earnings would, therefore, be a return on this capital commensurate with the risk being run. The proportions in which any surplus remaining (after these two calls have been met) is to be divided would depend entirely on the individual undertaking. But it must be laid-down that these benefits are to be paid-over direct to the interests concerned, and they must belong to, and their use and division be controlled entirely by, the individual interest. Thus the workers would have their benefit committee, which would receive the moneys after the declaration of bonus or benefits, and would decide for instance whether all the moneys received should be divided among the workers in proportion to the wages earned or whether only part should be so divided and the remainder put to reserve for paying sick benefits, providing extra holiday pay, contributions to their unions, and so on.

G. *Unemployment.*—Unemployment insurance is a necessity for the success of any general scheme of payment by results. No worker can be expected to make special efforts for production unless he feels sure that such efforts will not result in his or his fellow-workers' services no longer being required because of over-production. The presence of casual labour, and the movement of workers from one works or industry to another, make it impossible for any local scheme to be a success. The scheme must be a national one, but controlled by industry as a whole. The responsibility for the prevention of shirking should be the special care of the workers themselves.

I fully appreciate that in the proposals I have made many voids will have to be filled in, and many difficulties will have to be met and overcome. From my personal experience in industry, however, I am convinced that a scheme somewhat on the lines sketched above offers a solution of some of our industrial troubles. In endeavouring to evolve a workable scheme many problems have arisen. Some of them are very thorny; but I have not come across a single one that appears to me to be insurmountable provided there is on all sides a genuine desire to come to a fair and equitable solution.

DISCUSSION.

Mr. S. CUTLER, JUN., moving a vote of thanks to Sir Arthur Duckham, said they had had what he believed would become the standard reference for guiding them in this very important question of labour. He would suggest that the scheme put before the meeting was at the present stage rather a matter of ideals; and possibly they would find it very difficult for most of them to put the proposals into operation at once. In their own industry, the question of casual labour came in. Contractors were under necessity to put on an out-door job a large number of men whom they could not keep employed always. These men came and went; and it would be difficult to deal with them, and give them the benefits as could be done with permanent employees in the business at home. In regard to hours of labour, the question of education entered into the matter before hours of labour should be materially reduced. He had found that working men, though leaving work early in the evenings, as they did now, had little to do with their spare time. They were not readers of books or educated, and few of them occupied the time in any very useful occupation. They were left with too much time to hang about and discuss their grievances, real or otherwise, and consider what should be their demands for more to be got out of their employers. He rather strongly advocated the principle of piece-work. In piece-work they had the result of a man's good work and of his greater skill over others. If piece-work were universally adopted, he thought they would get along much better. Though the question of labour was a great trouble in this country, from his observations abroad during and since the war he asserted that conditions were nothing like so bad here as in other countries. He instanced Italy in particular as an illustration of the injury done to industry by too much trade union dominance.

Mr. VALE, in seconding, said the subject was an important and a very thorny one, and he would like to study the paper closely before passing an opinion on its various aspects.

Mr. C. S. BENNETT, supporting the vote, said in many things he agreed with Sir Arthur Duckham. In some matters he did not think Sir Arthur had gone quite far enough. It had been suggested that the average output per man in 1919 was only about 70 p.ct. that of 1914. He suggested that the present output was more likely only 50 p.ct. Sir Arthur's ideals on the solution of the labour problem were beautiful, but very hard to carry out. They were all anxious to better the position of their workpeople; but was not the output of a good man restricted by his union? Then, again, the difficulties of transport with which they had to contend were appalling. He had had occasion recently on which, where he ordered steel in 30 ft. lengths, they had to be cut in two to be delivered because the transport people could not provide proper trucks. Difficulties were increased by the variation in the rates of wages between one industry and another branch of work working side by side with it. A national wage would be of very great assistance; but difficulties would arise on the question of having to arrange a varying subsistence allowance. Contractors had to send to every part of the country; and men would not go from a large town, where the subsistence allowance was 40s. per week, to the smaller place where it was only 25s. per week, even though the cost of living was less in the latter place.

Mr. H. M. THORNTON said the paper was of extraordinary value to-day in view of the situation. Every thinking man must realize that at the present time we, as an industrial nation, were drifting. Europe was drifting, and so was the world at large. He did not wish to touch especially on politics in such a discussion as this; but he did feel that the present state of affairs in England was largely due to the fact that politics were controlling industry. Industry ought to control politics. This was not a political question, but a question vital to every man in the country, whether employer or employed. That was why he felt that the proposed Industrial Parliament would have a great effect in preventing the tendency towards everything being subservient to the vote rather than to the well-being of the man. Labour to-day was suspicious of parliamentary methods as they knew them, and was taking no part in the offices in which Labour should share. Unless they got to something of the sort suggested by the paper, how were they going to get this undesirable suspicion eradicated? He hoped a copy of the paper would be sent to the Prime Minister from the Society, with a recommendation that it should be given the closest consideration of himself and of the Cabinet.

Mr. DALY said he quite agreed with the paper in many ways; but it could hardly be denied that the experience of shorter hours and higher pay had been that the higher the wages the lower the curve of work. From April, 1917, when the Government awards commenced, the incentive seemed to have been taken away from good men to increase and improve their work. The initial fault lay with the Government's interference between employer and employed. [Hear, hear.] The result had been that the men, instead of going to their employers for a fair and open consultation, had simply gone straight to the Committee on Production with a demand—and they usually got it. The situation was largely an aftermath of the war, and the men had not yet settled down to work. There seemed at present to be no finality whatever. In his own firm's coal business, in 1914 the output was 25 cwt. per man per day; and now it was only 15 cwt. The wages to-day, on about 400,000 tons per year, were just 2½th over what they had been. In their undertaking they had sectional Whitley Councils, and they were doing good work; but the whole artificial rise in wages must be eliminated before the position could be made right.

Mr. R. J. MILBOURNE thought that it was generally admitted that some form of equalization must be found between the present-day luxury of some people and the lot of the workers. In his own works in a rural district, he had had a more peaceful body of men to deal with than in many other works; but owing to the influence of trade unions, the trouble came to him now as to most other concerns. He thought the suggested subsistence allowance was a very good idea, except that, early in the paper, Sir Arthur had rather knocked the thing on the head by putting forward the fact that the railwaymen were demanding an increased rate because the dockers had also had an increase. The danger of a flat-rate subsistence allowance would be to prevent its being increased by causes similar to that. He had attended a large meeting of employers in Birmingham at the time the reduction was being made from the old 53 to the new 47 hours' week; and it was remarkable that the whole of the employers present who had already adopted the 47 hours had given convincing evidence that by reducing the number of hours they had actually gained increased output. As soon as the generality of employers came down to 47 hours, there was hardly a firm in the British Isles who had not found a considerable reduction in output. This was a point which should be brought very forcibly before the men's unions; and for this reason he welcomed the suggested Industrial Parliament. The only other point to which he would call attention was in a later section of the paper. He would like to suggest to the President that he might have introduced, in addition to the point, "How can Benefits be Shared?" a section the title for which would be, "How can Losses be Met?" It was, of course, very easy to share-out benefits. But there were times of loss in all industrial concerns; and he thought the workmen should be made acquainted with the losses as well as the profits.

Mr. F. C. TILLEY said they should all welcome the address heartily from the point of view that it had been distinctly constructive. They often said "Something must be done;" but Sir Arthur Duckham had gone further and shown what ought to be done. He asked if Sir Arthur Duckham proposed that the subsistence allowance should be a flat-rate, payable whether the man worked or if he stayed away on the Monday. Would the man get his full subsistence allowance and lose only his hourly rate of wages? With regard to the Industrial Parliament, he very greatly liked the idea; but he would suggest that, in drafting the policy of the Industrial Parliament, everything possible should be left to the control of the local areas or shops. Mr. Cutler's suggestion that piece-work would be a panacea for all their ills was not quite correct. As piece-work could not be applied everywhere, he thought they must have some such scheme as that proposed by Sir Arthur Duckham, so that it could be applied generally. With regard to dealing with losses, this had been one of his own difficulties in considering the matter. It was easy to arrange for a division of profits; but when there was a loss, it was not so easy to get back from workmen money which had already been paid to them. At the same time, it was probable that, once they could get a scheme working on the lines proposed, it would be a pretty bad business that had losses, except very rarely.

Mr. THOS. GLOVER said to his mind the keynote of the address was in Sir Arthur Duckham's concluding remarks, when he said he had not come across any problem that was insurmountable provided there was on all sides a genuine desire to come to a fair and equitable solution. If they were going to make any progress at all, they had to restore confidence in the minds of the workers. The British working man had a bigger fund of common sense at heart than any other working man in the world; but this common sense was being deliberately upset by political bodies who were doing very strenuous, and in some cases insidious, work. Recently there had been set up a separate organization, known as Admiral Hall's Committee, which was doing very valuable work in counteracting all this mischievous propaganda. If the propaganda could be overcome, the laws of supply and demand, without Government interference, would settle things down. It would be within the recollection of Sir Arthur Duckham that an effort was made in March of last year to get employers and men into agreement, when a very large meeting of employers and trade unionists was addressed by the Prime Minister. The "Triple Alliance" of trade unions, he believed, was not represented there at all. The first speaker was Mr. Brownlie, Secretary of the Amalgamated Society of Engineers; but after his opening remarks the representatives of that Union withdrew. He understood there had been only one further meeting; and since then nothing more had happened in regard to the great Industrial Council which was then intended to be set up, much on the lines of the Industrial Parliament suggested by Sir Arthur Duckham.

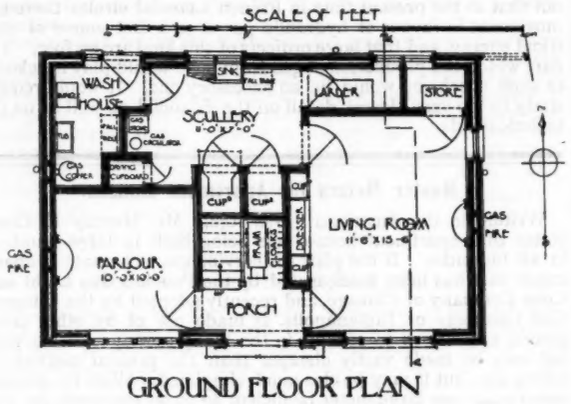
Mr. F. G. COCKEY said with regard to reduction of output, in fairness to his workmen, he must say he had not experienced this reduction. But, of course, his trade was almost entirely piece-work. From the figures he had taken out in the London works of his undertaking, he was convinced that he was getting more output in 47 hours than had previously been obtained in 50 hours—their former working time. In the Provincial branches of the business, he believed the results were very similar. He thought every possible support should be given by employers to Admiral Hall's Committee. With regard to the organized bodies representing employers and employed, he was afraid there was too much development in the direction of mere fighting purposes. While the Engineering Employers' Federation had done much good work, he could not help feeling that their relations with the employees were becoming unnecessarily hostile. He hoped some body on the lines suggested by Sir Arthur Duckham would come into being to deal with matters in a less fighting spirit. One question he would ask was with regard to the wage rate in addition to the subsistence allowance. He took it that this meant that the specially skilled men would have an opportunity of earning more than the men of less skill.

Sir ARTHUR DUCKHAM, replying to the discussion, said that he had chosen the subject for his address for the very reason that, as one speaker had said, there was too much talk about "something having to be done." He felt rather ashamed of himself in thinking he had nothing definite to put forward; and he chose the subject deliberately, so that he would force himself to think out some sort of solution for the problem. It was somewhat difficult to lay down in a paper this question of subsistence rate and wage rate. The subsistence rate was a rate to cover the net cost of maintenance. This was a basis of discussion. Every weekly wage earner (say) in Birmingham would get the same subsistence rate, whether he was skilled or unskilled. The idea was that, when they got that over, the trouble on the threat of strikes on the ground of the cost of living was wiped-away. The rate would vary quarter by quarter according to the statistical returns of the cost of living. If a man took a day off—apart from legitimate reasons such as illness, which were covered by insurance—the case would go before the works committee. He could assure his hearers that the works committees dealt properly with the men in such matters. His own works committee dealt with some engineers who had gone on strike without giving proper notice; and he believed the men lost £10 each from the benefit fund. The subsistence rate must be safeguarded so that a man could not draw it if he was not working. The wage rate was a rate according to the scale or grade of the worker. All unskilled or skilled workers in the country would be paid the same rate, except that if the worker were engaged in particularly dangerous or uncomfortable conditions he could be allowed an extra penny or so per hour, according to arrangement. It might be necessary to come to an arrangement as to degrees of skill, with rates varying accordingly. The idea was that they must get away from the impossible position of granting advances sectionally area by area and upsetting other sections of workers. Every local advance reflected almost immediately throughout the country. In answer to the question as to the lean years, in such years there would be no bonus after the payment of a proper dividend to the shareholders. He laid it down that the shareholders' dividend must be the first claim after the payment of the wages of the workers. In the lean year there would be no bonus. Any well-conducted concern, surely, would build-up a reserve in the good years against the possibility of lean years; and a reserve fund could be laid-by for benefits in the same way. With regard to the big meeting at the Central Hall, Westminster, he (Sir Arthur) was Chairman of various Committees during the war; and he found that no Committee came to anything unless at least one person there had some definite idea of what they were there for. He thought the great fault of the big meeting was that they were all called together with no definite idea of what they were going to do. Any meeting which was merely a discussion of the situation and had no definite object laid down beforehand would never get to anything. Knowing the Prime Minister as he did, he was pretty sure that the Premier had no very definite idea as to what he wanted from that Westminster meeting. He wanted "something to be done;" but if he had gone to the meeting with a definite constructive idea, he would in all probability have got what he wanted.

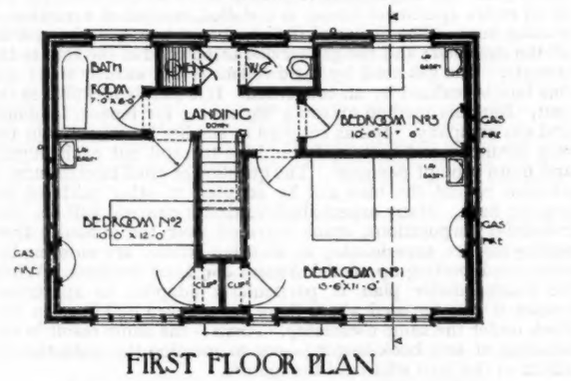
The members then adjourned for light tea, served in the Mining Survey Room of the University, by the invitation of Mr. George Clark, of Chesterfield.

PLYMOUTH'S MODEL ALL-GAS COTTAGE.

THE model of the "All-Gas" Cottage, plans and a front sectional view of which are given, is a copy of a cottage erected through the energy of Mr. Percy Hoyte, the Engineer of the Plymouth and Stonehouse Gas Light and Coke Company, in which one of their employees is now living. The cottage was designed by Messrs. Thornely and Rooke, of Plymouth; and while the accommodation is modelled generally on the requirements of the Ministry of Health for cottages of the "B" Class or Parlour Type, it embodies some unique features.

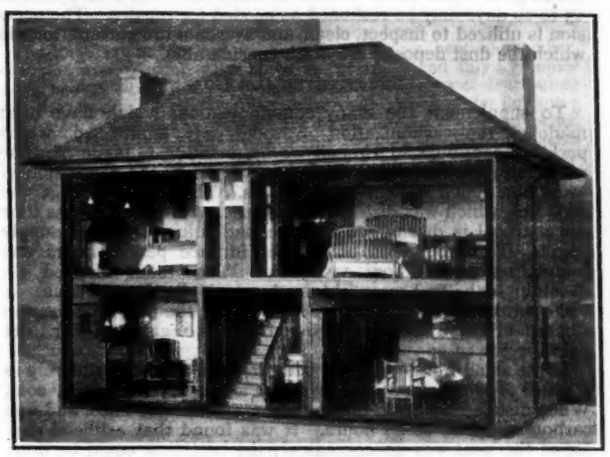


GROUND FLOOR PLAN



FIRST FLOOR PLAN

The method of construction is that devised by Major Cornelius Wheeler [already described in the "JOURNAL"], by which the flues of the gas apparatus are constructed in the cavities of hollow walls. There is a 4½-in. brick wall, then a 3-in. cavity, and then another 4½-in. wall, thus providing an air-cushion between the two walls, which are held together at intervals by barbed irons. This not only secures warmth and dryness, but enables the owner to dispense with plastering or the use of laths. It is calculated that a house of the character of this model will mean a reduction of £59 in actual cost, a saving which is achieved by dispensing with chimney-flues and chimney-breasts, and substituting gas-fires fixed into recesses—thereby economizing all the space within a room occupied by the fireplaces.



The cottage contains living-room, scullery, parlour, three bedrooms, and bathroom, with the usual offices, and every possible convenience in the form of store-room and cupboards. While the gas-fires and gas-cooker are more or less familiar to everyone, it is in the domestic appointments that the utility of gas is most fully demonstrated.

Basins with hot and cold water are provided in every bedroom, and the kitchen or scullery has all the latest labour-saving appliances. It has a sink and drainer-board; the gas-cooker and hot-water circulator being in a special recess, with a drying cupboard alongside, while the small wash-house adjoining contains a gas-heated wash-copper.

The model and apparatus are entirely the work of the Gas Company's staff at their Coxside works; and it has been fitted throughout with model furniture—one-eighth ordinary size—made by disabled soldiers at the local Lord Roberts' Memorial Workshops.

With such an example of what can be built on economical lines, it is hoped that more houses on the plan shown will appear all over the country, to remove the very serious congestion that now prevails.

REPORT ON SOME MATTERS OF MANUFACTURE.

Water Gas—Substitutes for Coal—Standardization of Horizontal Retorts—Centralized Carbonization.

Among the communications to the recent congress of the Société Technique du Gaz was the report of the Commission on Manufacture, which dealt with several questions of interest. Perhaps the chief of these was the technics of water-gas manufacture—now of greater interest to French gas-men on account of the relaxation of the official regulations which hitherto have prohibited the supply for domestic purposes of a mixture of water and coal gas. The report also refers briefly to the use of substitutes for coal. It further deals with the standardization of horizontal retorts; and, finally, with a scheme of centralized carbonization of coal in the localities of the mine-fields.

WATER GAS.

With a prefatory comment on the Morvan process, to the effect that it has proved disappointing in practice owing to the rapid wear of the refractory material, the chief items in this part of the report are as follows, the details being quoted as applying to production of the order of 15,000 to 20,000 cb.m. per 24 hours.

Coke consumption per cb.m. of water gas should average about 1 kilo, 200 gms. of which are used for the steam blast. This figure varies greatly according to the ash-content of the coke. Steam averages 800 gms. per cb.m.; condensing water 7 to 8 litres; and motive power about 24 watt-hours, when using a Roots fan for the blast.

Manual labour, normally a considerable item for the removal of clinker from the gas producers, is required in greater measure owing to the quality of present-day coke. Where formerly it sufficed to remove clinker four times in 24 hours and within 30 minutes, the existing conditions require it every three hours and an hour for the operation, the nature of which makes great demands on the workmen. Moreover, the producer has to be completely emptied every 5 or 6 days, and the clinker broken-out with a crowbar, putting the producer out of action for 5 or 6 hours. Use of a coke of small ash-content, which would be an effective preventive, is unattainable. It is found that a producer making 14,000 cb.m. per hour requires a foreman on the first floor, two workmen on the floor level, and one or more hands for the removal of clinker.

For carburation, the oils (in order of preference) are Baku, American, and Galician of density 0·86 to 0·90; hydrogen content, 11 to 12 p.ct.; and flash-point 80° to 100° C. The tar produced is preferably burnt in the works or elsewhere, and not mixed with coal tar, as it renders this unfit for distillation. About 15 or 20 p.ct. of the weight of the oil is obtained as tar of greater fluidity than that from coal. As regards the increase in calorific power, it may be taken that 100 gms. of oil per cb.m. add 250 calories; so that 350 gms. of oil are required to bring water gas from 2600 to 4500 calories.

The hydraulic main should be completely separated from the washer. The tar separators require to be of ample size, owing to the difficulty of the operation; and of the other plant, the extractors in particular should be designed to meet the special functioning of the process, which is characterized by about one-quarter of the total make of a period of injection being produced during the first minute. The extractor is thus subjected to great variations in the volume of gas, and the use of a gasholder is almost indispensable.

All mains require to be laid with unions which can be readily dismantled. Apart from the ordinary deposits of dust, there is produced in washing (particularly with the aërated water usually employed) a greenish-brown pasty deposit, which gradually fills the mains, and must be removed. This deposit—which contains

30 p.ct. sulphur, 40 p.ct. silica, and 30 p.ct. oxide of iron—appears to be produced by the action of the oxygen of the washer-water on the hydrogen sulphide and hydrogen silicide contained in the crude gas. After three or four months' working, a stoppage of 15 to 20 days may be reckoned as needed for repairs. The occasion is utilized to inspect, clean, and overhaul the carburettors, in which the dust deposits are often considerable.

Substitutes for Coal.

To supplement the many communications which have been made on the carbonization of wood, peat, lignite, &c., which perforce continues in French works, mention is made of some results obtained in the Zurich Gas-Works by the distillation of wood in a bench of eight Coze settings. The average charge was 100 kilos, which was distilled in 4 hours. At the end of this time the charcoal is discharged and the distillation of a fresh supply begun. The production of gas per furnace per 24 hours was found to average about 1500 cb.m. The woods distilled (fir, chestnut, oak, &c.) were obtained principally from Tessin. A test operation with four Coze settings gave the following results: Content of moisture in wood, 30 p.ct.; yield of gas, 27·5 p.ct.; net calorific power, 2655 calories.

In the same works peat has been distilled almost exclusively in a bench of ten vertical retorts either alone or mixed with coal. When distilled by itself, the charge was about 500 kilos, and was carbonized in 12 to 14 hours. It was found that artificial drying of the peat was uneconomical; the best that could be done being to use peat only in good weather, allowing it to dry by free exposure to the air. At Zurich also, acetylene has been made with generators yielding about 2500 cb.m. per 20 hours. The carbide was fed by manual labour; automatic feeding having been found impracticable. An attempt was made to purify the gas made from wood and peat by using the fluid residue from the generation of acetylene for the removal of carbonic acid; but the results were unsatisfactory. An important point, confirming previous experience, is the separate collection of the tar from the wood and that from the coal. A mixture of the two absorbs considerable quantities of water, greatly depreciates the value of the tar, and complicates the use of wood for carbonization.

Standardization of Horizontal Retorts.

The Commission's report proceeds to examine the question of standardizing the dimensions and form of retorts in the hope that a few standard types are likely to be universally adopted. It is recalled that in 1885 a previous Commission made the recommendation that retorts should be of four types—namely, of arch section in two sizes and of an elliptical and of circular section.

As regards the thickness of retorts, it is almost generally agreed that the body should be of 70 mm. thick, and the enlarged portion of the head 95mm. The Commission found itself unable to contemplate a standard length. The state of repair of a setting at the time the retorts are being put in would often require appreciable modifications in the length. It is suggested that two lengths might be adopted as standard—viz., 2·90 m. for retorts of the ordinary pattern and 3·05 m. for open-ended retorts. Other lengths of the ordinary pattern might then be obtained by using an open-ended piece, brought to the required length at the works and one end closed by brickwork.

The feature of a retort most susceptible to standardization appears to be the cross-sectional shape. The elliptical and circular retorts recommended in 1886 have almost completely disappeared, while the arch type is met with only in very small works. On the other hand another form—that of ⊔ section with a curved bottom—has come more and more into use. The flat-bottomed retort is certainly the easiest to instal, while its capacity and heating surface are slightly superior. But on the other hand it is less efficient as regards the removal of the carbonized charge. The merits of the curved-bottom pattern are a greater resistance to sag, and, owing to its external shape, a better circulation of the combustible gases in the furnace. Moreover, the retort mouths are more readily made gas-tight than in the case of the flat-bottomed type, the right-angled corners of the latter being parts where the production and maintenance of a perfect seal present difficulties. It is recognized, however, that the abolition of the flat-bottomed type, which is still widely used, would involve many difficulties; and it is therefore suggested that the two types should be retained and that their dimensions should be as follows:

Section:	Flat-bottomed	64 × 35
	Curved-bottom	64 × 36
Thickness:	Body of the retort	70 mm.
	Mouth	95 mm.
Length:	Open-ended	3·05 m.
	Ordinary pattern	2·90 m.

The Commission has also drawn-up and embodied in diagrammatic form its recommendations as to the bolt-holes and bolts for mouthpieces, mentioning that the threaded portion of the bolt should preferably not extend into the material of the retort.

Centralized Carbonization.

The Commission brings its notes to an end by some general comments upon a national programme of carbonization, which formed the subject of a report in June, 1919, by M. Métivier. The programme, which the author states to be very abbreviated and superficial, concerns itself with carbonization of coal on a large scale in appropriate localities for the purpose of distribution of gas for heating and for the production of bye-products to be used as fuel. The coke, it appears, is to be converted into a gas which can be used in internal combustion motors or under boilers at central stations for the production of electrical energy. The Commission contents itself with pointing out a few of the actual facts to which recognition is not paid in M. Métivier's scheme—*e.g.*, the omission to distinguish between different coals as regards their coking qualities. Figures which apply to a good gas coal or to coke have no relation to other classes of coal the tonnage of which represents a considerable proportion of the whole French supply. A further point which is ignored is the increase in the cost of gas consequent on its distribution over a very wide area. While endorsing M. Métivier's views as to the advantage of the central generation of electrical energy, the Commission points out that at the present time in French financial circles there is a movement in favour of hydraulic power as a first source of electrical energy, and that large projects of this kind are on foot. The part which the production of gas from coke would play in relation to such a scheme would be an accessory one. It would require study in the very closest detail on the financial as well as on the technical side.

Master Meters for Apartment Houses.

Writing in the American "Gas Age," Mr. Murray E. Crain states that apartment houses are being built in large numbers in all big cities. If the plan for serving gas to tenants in apartments that has been inaugurated by the People's Gas Light and Coke Company of Chicago, and recently adopted by the Citizens' Gas Company of Indianapolis, is made use of by other companies, gas service to tenants in the many new apartments may not only be made vastly cheaper than the present method of selling gas, but it may be also much simplified. With the master meter plan, one large meter (sufficient to cover the needs for gas of an entire apartment house) is installed, instead of a number of smaller ones. The owner of the apartment house is charged for all the gas used; and the gas service is included in the rent to the tenants. The gas used by flat-dwellers is not exactly free; and this fact is realized by all concerned. It is merely included in the rent. But this method means a big saving for tenant, landlord, and gas company. It has resulted in smaller investments in the way of mains and meters, fewer bills to send out each month, and more prompt payment. The question of chief interest now is whether or not the idea can be adapted to other parts of the housing field. Many experts believe that it can and will be. Big industrial corporations, much alarmed over the difficulty their employees are experiencing in securing homes, are entering the arena, and putting-up model houses for their workers. While the master meter plan is particularly adapted to apartment houses, it can be used where there are a dozen buildings in one block under the same ownership. There is the same result in the entailing of less book-keeping—not to mention the reduction in labour of the men who read the meters.

The Trend of Progress.

Speaking of the trend of progress in gas supply, in an address to the Detroit Engineering Company, Mr. F. W. Steere remarked that blue gas finds its greatest application in industrial heating. Though its cost per million B.Th.U. is higher than that of producer gas, it can be used efficiently in inexpensive furnaces. One of the difficulties in using blue gas in industrial plants is the finding of sufficient ground space for the apparatus and relief holder. A very attractive type of plant has been developed by the U.G.I. Contracting Company, of Philadelphia. It is a combination coal-gas and blue-gas plant. Bituminous coal is carbonized in a vertical retort, and the coke taken up and delivered to a bin over the water-gas house. From this it goes into the generator. It is claimed that with this plant a ton of coal can be completely converted into gaseous fuel, with the exception of 12 to 14 gallons of tar—making a total of 15 million B.Th.U., in 375 B.Th.U. gas, from the combination. This type of plant, though expensive in first cost, has the advantage of running on one kind of fuel only—that is, bituminous coal, which is most easily obtained. In addition to this, it delivers a gas of 375 B.Th.U., in place of 300 B.Th.U., as in the ordinary blue-gas plant. As to producer gas, it is necessary to distinguish between gas used hot—that is, where no attempt is made to cool and clean it—and other applications for which it is necessary that the gas be cooled and cleaned. Up to date, by far the most successful applications of producer gas have been where the gas could be used hot. Though producer gas is the cheapest gas which can be made per B.Th.U., yet its dilution with over 50 p.ct. of nitrogen very greatly diminishes its attractiveness as an industrial fuel. For example, if a forging temperature is to be obtained with producer gas, this can only be done economically by resorting to regeneration, or a highly efficient form of recuperation. This adds a very great financial burden to an already expensive plant and distribution system; and in many cases such furnaces are not practical. The best evidence to support the contention that the standards imposed upon town gas are unreasonable, is the fact that they have been greatly modified in many States. Gas companies, like other public utilities, are at the mercy of the public; and unfortunately the public, in most cases, are not fully informed on all the facts.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Life of Gas-Meters Joint Committee.

SIR,—During the discussion at the meeting of the Institution of Gas Engineers on the report of the above Committee, Mr. H. Townsend, of Wakefield, made the following statement: "On investigating under the microscope the valves of the meters undergoing treatment with paraffin, as suggested by Mr. Taplay, it was found that paraffin cleaned the valves and valve-seats, but left them unlubricated." Mr. Townsend then indicated a mixture which he has found effective for cleaning the valves and leaving them lubricated. In making the above statement, the writer feels that Mr. Townsend has created a wrong impression.

When reading before the Institution the paper on the "Corrosion of Dry Gas-Meters," in October, 1918, the writer said that dry meters brought away from districts should be sprayed in a general way with a *paraffin distillate*. Some *solar distillate* such as is used for carburetting water gas was therefore obtained, and experiments were made at the Haggerston meter-works. Solar oil is still used for this purpose, and was chosen because it cleaned and lubricated the valves and valve-seats of the meters; and, what is important, it does not "gum." This distillate has a specific gravity of 0·85 to 0·87.

J. G. TAPLAY.

7, *Tudor Street, Blackfriars, E.C.* 4,
June 16, 1920.

Motor Users and Benzol Production.

SIR,—Captain Montgomery's letter in your issue of the 15th inst. would seem to imply that the gas industry failed to appreciate the importance of home-produced motor benzol and the energy with which the Automobile Association and Motor Union had conducted their campaign to popularize its use. Such, of course, is not the case. The only point at issue between the gas industry and the Automobile Association is one of economics.

The primary object of the gas industry must always be the supply of gas at the lowest possible price to the consumer. If the industry were able, by the production of crude benzol, to reduce the manufacturing cost, and thereby the selling price, of gas, no exhortation to extract benzol would be needed. The position at the present day is, however, that, at the price obtainable for crude benzol, its recovery can only be undertaken at a loss, which must of necessity be borne by the gas consumer. It has been estimated that this loss would involve the consumer in an additional payment of 1d. per 1000 c.ft. of gas, for which he would receive no corresponding benefit.

Captain Montgomery's proposal would, therefore, resolve itself into a tax upon the gas consumer for the benefit of the whole community—a proposal which I am confident Captain Montgomery would not, in the full light of the facts, be willing to endorse.

EDWARD J. FOTTRELL,
Manager, National Gas Council.

39, *Victoria Street, S.W.*1, *June* 17, 1920.

REGISTER OF PATENTS.

Burners for Gas Water-Heaters.—No. 142,660.

ROUSE, E. E., of Newquay, Cornwall.

No. 11,668; May 9, 1919.

This invention relates to a gas-burner controlled by a single valve and adapted to be turned on simultaneously, in which the number of parts is reduced to a minimum, and a novel arrangement for the admission of air to the bunsen ring is provided. The apparatus is further characterized in that the inlet valve parts act as a device to secure the valve as a whole in place—a simple rotary movement of the whole apparatus serving to turn on or off both the water and the gas according to the direction of movement.

Furnaces for the Heat Treatment of Metals. No. 142,671.

YATES, H. J., and BRAYSHAW, S. N. & E. R., of Hulme, Manchester.

No. 12,747; May 21, 1919.

This invention relates to furnaces in which metal articles are heated in a non-oxydizing atmosphere in an externally heated chamber closed at the entrance and opening into a cooling bath into which the articles are withdrawn without contact with the air. This furnace is constructed with a heating chamber closed or separated from the combustion chamber and the heating medium [coal gas], and fitted with a swivelling or movable hearth or floor, or having an aperture in the hearth and a shoot below the hearth through which the articles, which have been tipped or dislodged from the hearth, will fall by gravity direct into a quenching bath without being brought into the air.

Gas Water-Heaters.—No. 142,661.

ROUSE, E. E., of Newquay, Cornwall.

No. 11,670; May 9, 1919.

This invention relates to water-heaters in which water ascending through a central column is distributed from the head of the column to the outer wall of a heating chamber surrounding the column. It has for its object the provision of means for conducting water from the central column to the outer annular space, during which it is subjected to the direct action of the hot gases of combustion.

The water is passed through a distributing head on the central column, and falls in a film (or in thin streams) on to an inwardly inclined baffle, directing it against the outer wall of the heating chamber—the gases of combustion leaving the latter chamber by passing through the water or through the distributing head.

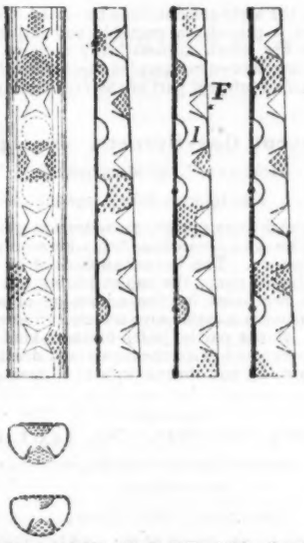
The combination consists of a central column; a heating chamber, from which combustion gases leave at the upper end only; an outer casing concentric with the heating chamber; and a water distributing head on the central column, over or through which water flows in a film (or in thin streams) directly on to an inwardly inclined baffle, directing it against the outer wall of the heating chamber—the gases of combustion leaving the heating chamber by passing through the descending water as it leaves the distributing head.

"Fuel" for Gas-Stoves, Gas-Fires, &c.—No. 142,726.

RICHARDSON, W. H., and ALLENDER, J. J., of Warrington.

No. 21,365; Aug. 30, 1919.

This invention is designed to provide an improved "fuel" of a much stronger character than the fire-clay tubes hitherto employed, and of a different construction, the tubes "becoming incandescent throughout substantially their whole surfaces under the heat of the gas-flames."



Richardson and Allender's "Fuel" for Gas Stoves.

A front elevation is given of four types of tube proposed, also two sectional plans of the first one.

The tubes are made from sheet metal (perforated all over) of any suitable cross-section and of the required length. The cross-section usually adopted is D-shaped with the curved face of the tube to the front and the flat face at the back. Longitudinally the tubes are (preferably) tapered; the widest end being nearest the gas-jets. The curved front faces of the tubes (apart from the general all-over perforations) are provided with larger perforations of any "suitable pattern," usually formed by slitting the perforated plates and pressing the material inwards—so forming a number of separated projections within the tubes, against which the gas-flames impinge in passing up. The back inside faces of the tubes are provided with a number of projections partly spherical, pointing towards the front faces of the tubes, against which the flames also impinge.

Gasifying Solid and Liquid Fuels.—No. 142,945.

FREEMAN, N. H., of Dorset Street, W.

No. 4154; Feb. 19, 1919.

This invention relates to the gasifying of solid and liquid fuels, and has for its chief object to provide for the spontaneous ignition of fuels by subjecting them to the action of a gaseous medium produced by superheating a liquid compound and presenting to the fuel the gaseous medium when the latter is raised to a temperature equal to, or higher than, that of the fuel ignition.

In connection with the gasifying of fuels, it has been proposed to feed powdered or liquid fuel through a heated chamber into a subjacent retort containing incandescent fuel—the powdered fuel being decomposed before reaching the retort by means of steam which has been greatly superheated by its passage between hot plates. Further, it has been proposed, in connection with apparatus for generating and burning gases or vapours from hydrocarbon oil and water, to superheat the steam as it passes from the generator and mix it with the oil or oil vapours prior to its reaching the burner—the pipes or superheating chambers being arranged in such a manner as to become intensely heated by the burning gases or vapours.

According to the invention, water is converted into steam, which is heated to a temperature equal to or exceeding the ignition point of the fuel to be gasified, and is then presented to the fuel in this highly heated condition in a chamber in which the temperature is maintained at or above the ignition point of the fuel used, whereby the necessary heat is supplied to maintain the combining action of the superheated steam and fuel. If oil be the fuel to be gasified, it is injected into a

current of the highly-heated steam by a suitable atomizer; or if coal be the fuel, it may be pulverized and, without being preheated, fed into the chamber with the steam raised to the highly heated condition. The temperature, in the case of coal (for example), should not be below 1112° Fahr.

Heat Reflector for Gas-Fires.—No. 143,016.

SCOTT-SNELL, C., of Wimbledon.

No. 11,147; May 5, 1919.

This invention relates to means for more efficiently distributing heat from (more especially) gas-fires, where the underside of the radiants are in direct contact with the flames, and more heat is therefore thrown downwards than upwards. The invention provides a portable means by which the direction of the reflected heat rays may be varied at will.

In one form there is provided a flat plate, having a polished face which normally forms a horizontal platform before the fire. It is supported near the fire by a U-shaped strip of metal riveted to the plate; and pivotally attached thereto, near its junction with the plate, is another somewhat similar piece of metal, but so curved as to rest on the ground under the rear part of the plate.

Riveted to the extremities of the first support (where it bends upwards) are two metal strips curved to a radius concentric with the pivots, and fastened to the plate at their outer ends, so as to form frictional rubbing pieces for the second support, whereby the angle of the plate remains fixed when adjusted, as can readily be done by hand when the foot is placed upon the horizontal part of the second support.

Constructionally the arrangements may be varied to suit conditions; but under all forms it provides a portable and adjustable reflecting surface before the fire which automatically remains stationary and "requires no adjusting screws or complex mechanism for its operation and which, being not an integral part of the fire frame, can be removed at will."

Incandescent Gas-Burners.—No 143,087.

HOLLAND, J., of Manchester.

No. 16,879; July 5, 1919.

This invention relates to an upright incandescent gas-burner for use in places such as passages, lavatories, &c., where only a single small light is usually necessary. The burner consists of an ordinary bat's-wing without the steatite part; the top end being left open. In the sides of the burner are holes for the admission of air; and fitting within or on the burner is a metal wire crutch for supporting a small size of gas-mantle, of the partly (soft) finished kind—*i.e.*, made of ramie or cotton impregnated with chemicals and dried and stretched to shape, but not burnt-off and shrunk prior to stiffening as in the case of hard mantles.

Igniting Gas-Jets.—No. 143,141.

FAIRBROTHER, H.; a communication from MARTIN FISCHER, of Zürich, Switzerland.

No. 27,409; Nov. 6, 1919.

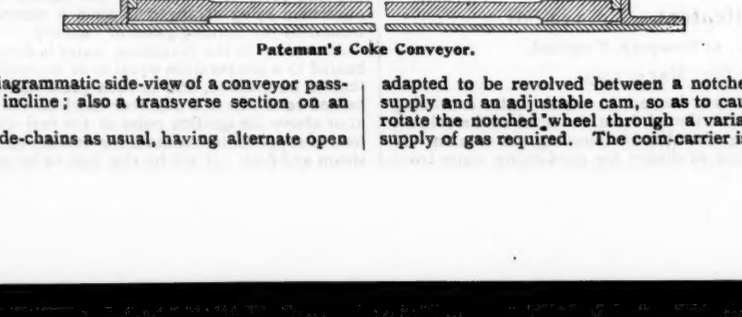
This device for igniting gas-jets is of the kind in which the actuation of an arm or lever serves to place a spring under tension and release it—the tension of the spring being utilized to move a frictional surface over a piece of pyrophorous metal or the like, thereby producing sparks adapted to light the gas. The hand-actuated spring acts on the rotary member on which another spring, attached to the serrated disc, is loosely mounted in such a manner that, by tensioning the hand-actuated spring, the disc-actuating spring remains stationary, but by releasing the hand-actuated spring the rotary member engages the disc-actuating spring by friction—transmitting thereby its rotary motion to the serrated disc.

Conveyors for Coke, Coal, &c.—No. 143,344.

PATEMAN, J. W., of Croydon.

No. 6876; May 19, 1919.

This invention relates more particularly to plant in which hot coke is conveyed away after being discharged from gas-works' retorts on to the floor of the retort-house. Each of the conveyor plates is arranged obliquely, so as to serve as a scoop, and has the upper edge curved towards the direction of travel and extended above the transverse plane of the side-chains of the conveyor, so that they may prevent the coke running back over the conveyor when it is moving up a slope after leaving the retort-house.



Pateman's Coke Conveyor.

The illustration shows a diagrammatic side-view of a conveyor passing along the flat and up an incline; also a transverse section on an enlarged scale.

The conveyor comprises side-chains as usual, having alternate open links A and closed or solid links B; and each pair of solid links is connected by a conveyor plate C. These plates slope forward, so that they act as a series of ploughs to scoop under the coke—the slope angle adopted being such as will ensure the scoop action and at the same time the forward propulsion of the coke without any likelihood of the latter slipping back over the conveyor. By this arrangement each conveyor plate, and thus the whole conveyor, will always be held down by the weight of the coke, so that there is no possibility of its riding-up.

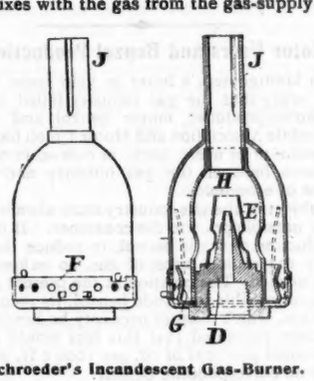
To connect an open to a solid link the outside link-plate E is formed solid at each end with a gudgeon F adapted to engage an inner link, which fits up against the shoulder formed by the reduced gudgeon. After the inner link is fitted on, the reduced ends of the gudgeon are burred over so as to complete the joint. To increase the wearing capacity of the outer links, their rubbing surfaces are fitted with dummy rivet heads L; while in order to allow for the swinging movement which constantly occurs between the abutting cheeks of the open and solid links, the metal around the gudgeons of the open links and the corresponding holes of the solid links is increased in thickness so as to constitute bosses which allow for wear.

Gas-Burners.—No. 143,433.

SCHROEDER, F. W., of Kennington, S.E.

No. 18,426; July 24, 1919.

This invention relating to incandescent gas-burners consists in the mode of admitting the requisite air to the outer and inner chambers of a mixing device so as to allow the amount of air admitted being regulated in accordance with the quality of gas supplied, and the air to be heated before it mixes with the gas from the gas-supply nipple.



Schroeder's Incandescent Gas-Burner.

An elevation and a vertical section of the mixing device portion of the burner are given.

The shield or outer casing surrounding the inner chamber of the burner is formed with an open end which is closed by a metal washer held in position by being supported on, or clamped between, the lower edge of the outer casing and a flange formed on the gas-supply nipple D, which carries the bunsen tube E. Around the lower edge of the casing are a number of openings (suitably spaced) in a single circular row encircled with a sleeve-piece F, having a correspondingly arranged row or set of openings so that, the sleeve being slidably or rotatably mounted on the casing, the two sets of openings can be brought more or less into register with one another, and the areas of the unobstructed passages through the openings thereby regulated as desired.

Inside the outer chamber (opposite the row of openings in its wall) is a tubular or cup-like deflecting device G so shaped that air passing through the unobstructed portions of the openings and impinging on the device will be deflected into contact with the portion of the inner surface of the wall or casing above the openings before it flows through the lateral openings in the wall of the mixing chamber H. The height of the deflector is such that the upper edge of it will be below the level of the openings, or the deflector may be extended higher up, in order that the air may remain for a longer period in proximity with the casing, which is fixed to the mixing-tube J.

Prepayment Gas-Meter Mechanism.—No. 143,446.

JAMES MILNE & SON, LTD., and STANIFORTH, H., of Edinburgh.

No. 20,809; Aug. 25, 1919.

This invention relates to gas-meters in which the coin-carrier is adapted to be revolved between a notched wheel operating the gas supply and an adjustable cam, so as to cause the coin to engage and rotate the notched wheel through a variable angle according to the supply of gas required. The coin-carrier is pivotally connected to the

shaft, about the axis of which it is adapted to revolve, so that it is capable of a rocking movement at right angles to the notched wheel under the action of the adjustable cam—a spring being provided for retracting the coin-carrier from the notched wheel. The adjustable cam is preferably stamped out of a rotatable disc. A fixed cam for co-operating with the coin-carrier is also provided, equivalent in length to the travel of the notched wheel necessary for the minimum gas supply.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for June 16.]

Nos. 15,290—16,009.

ALLISON, T. M.—"Washers, &c., for coal, coke, &c." No. 15,842.
BADISCHE ANILIN UND SODAFABRIK.—"Process for transforming ammonia into a salt for use as a fertilizer." No. 15,458.
BROWNING, C.—"Gas-burners." No. 15,895.
CHRISTIANSEN, E.—"Taps or valves." No. 15,672.
DAVIS, H. W.—"Water, &c., heaters." No. 15,416.
DOLPHIN, J.—"Atmospheric gas-burners." No. 15,810.
FARRER, F. T.—"Bath geysers." No. 15,518.
FINLAY, G.—"Means for preventing actuation of gas-cocks, &c." No. 15,888.
GREEN, A.—"Frame for gas-cookers." No. 15,408.
HAINS, E. A.—"Gas-burners." No. 15,895.
HAMILTON AND CO., R. F.—"Pyrometers of thermocouple type." No. 15,678.
HARDY, J. T.—"Automatic inverted self-lighting gas-burner." No. 15,828.
HELPS, G.—"Bunsen-burners for cooker-burners, &c." No. 15,766.
HOWLETT AND CO., M.—See Dolphin. No. 15,810.
IRINYI, A.—"Apparatus for semi-coking of coal, shale, &c." No. 15,778.
JACKSON, H. A.—"Combined coal and gas grates." No. 15,302.
KAYSER, T.—See Irinyi. No. 15,778.
KINZLBERGER AND CO.—"Process for purification of crude anthracene." No. 15,354, 15,454.
LEE, F. J. R.—"Gas-saving devices for gas-cookers." No. 15,831.
LILIENFELD, J. E.—"Electrical precipitation of solid materials from gases." No 15,746.
LÖWENSTEIN, KARL, PRINCE OF.—See Irinyi. No. 15,778.
MALLETT, F. J.—"Gas regulators and governors." No. 15,290.
METALLBANK UND METALLURGISCHE GES.—See Lilienfeld. No. 15,746.
PERRY, W. P.—"Apparatus for distilling carbonaceous material." No. 15,341.
PESTALOZZI, G. A.—"Method for producing tar of aliphatic compounds or low-temperature tar." No. 15,651.
PILE, F. S. J.—See Hamilton. No. 15,678.
POORE, P.—"Retorts for destructive distillation of carbonaceous substances, &c." No. 15,386.
SCHÖNDELING, W.—"Quenching of coke." No. 15,750.
SOC. ANON LE COKE INDUSTRIEL.—"Apparatus for separation of coke or carbon from slag, &c." Nos. 15,729, 15,730.
STONE, G. E. M.—See Hamilton. No. 15,678.
THOMPSON, H. S.—"Manufacture of incandescent mantles." No. 15,425.
TULLY, C. B.—"Production and utilization of gas." No. 15,489.
WHEATLEY, R.—"Means for storing and compressing coal gas on motor-cars." No. 15,600.
YATES, H. J.—See Dolphin. No. 15,810.

European Gas Company, Ltd.

The Directors of the European Gas Company, Ltd., we learn from the General Manager and Secretary (Mr. F. Eliot Williams), have decided that, as the operations for the year 1919-20 show a loss due to the unprecedented rise in the price of coal, labour, and stores, and to the heavy depreciation in the exchange value of the franc, they are unable to recommend the payment of a final dividend for the year. Negotiations with the various municipalities in France for increases in the price of gas are, however, proceeding favourably. Considerable sums are due to the Company in respect of losses incurred during the year; but, until definite figures are agreed with the authorities, credit cannot be taken for them in the accounts.

Proposed Extensions at Stourbridge.—A local inquiry has been held by Mr. R. T. Hetherington, on behalf of the Ministry of Health, into an application by the Town Council for sanction to borrow money for extensions and improvements at the gas-works. The Town Clerk (Mr. W. W. Goddard) said the application was for a loan of £45,000 for twenty years, or longer if possible. Mr. C. H. Webb (the Gas Engineer and Manager) stated that the total capacity of the present plant was 1,350,000 c.ft. per day; but this was insufficient for the needs of the district. It was proposed to put in four settings of vertical retorts, with a capacity of 1,000,000 c.ft. per day. The prices charged for gas were 3s. 8d. per 1000 c.ft. for domestic purposes and 3s. to 3s. 6d. for power.

Stafford Gas Undertaking.—The analysis of the accounts of the Stafford Corporation Gas Department for the twelve months ended March 31, which is signed by the Engineer and Manager (Mr. W. M. Valon), shows that the coal carbonized and the coal equivalent of oil and coke used in the manufacture of carburetted water gas amounted to 21,089 tons; the gas made being 324,766,000 c.ft., of an average calorific value of 475 B.Th.U. gross. The make of gas per ton of coal carbonized, &c., was 15,399 c.ft. The net proceeds of residuals on cost of coal, &c., was 54·97 p.ct. The output of 324,766,000 c.ft. of gas from the works compares with 280,618,000 c.ft. for the previous year. The total number of meters in use on March 25 last was 6988; and in 1919, 6924. The balance on revenue account carried to profit and loss is £7948; the net profit (after deduction of capital repaid, interest, and income-tax) being £2251.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Uxbridge and Wycombe District Gas Bill was reported with amendments.

The Gas Provisional Orders Bill was brought from the Commons, read the first time, and referred to the Examiners.

The Gas and Water Provisional Orders Bill was brought from the Commons, read the first time, and referred to the Examiners.

The Redcar Urban District Council Gas Bill was read a second time, and committed.

The Dumbarton Burgh Gas Order Confirmation Bill was read the third time, and passed.

HOUSE OF COMMONS.

Progress of Bills.

The Examiners reported that Standing Orders not previously inquired into had been complied with in the case of the South Suburban Gas Bill, which was ordered to be read a second time.

The Gas Provisional Orders Bill was read the third time, and passed.

The Gas and Water Provisional Orders Bill was read the third time, and passed.

The Wandsworth, Wimbledon, and Epsom District Gas Bill was read the third time, and passed, with amendments.

The Ministry of Health Provisional Order (Gas) Bill was read the third time, and passed.

The Hove Corporation and the Corporation of Brighton have withdrawn their petitions against the Brighton and Hove Gas Bill.

Committee on the Gas Regulation Bill.

Notice has been given by Sir William Joynson-Hicks of his intention to move in Committee on the Gas Regulation Bill the insertion of additions providing that the Board of Trade may prescribe, in the case of any Order providing for the repeal of any enactment compelling the undertakers to supply gas of a prescribed illuminating value, that the undertakers shall erect and work to the satisfaction of the Board suitable plant for the extraction of benzol and such other bye-products of coal as may be essential in the public interest.

Notice has been given of a large number of amendments to be moved in Committee on the Gas Regulation Bill; but it is unnecessary to set them out in detail here, as notice is taken of them in our editorial columns.

Sir Samuel Roberts reported from the Committee of Selection that they had added the following fifteen members to Standing Committee A (in respect of the Gas Regulation Bill): Sir Ryland Adkins, the Lord Advocate, Major Barnes, Mr. Bridgeman, Sir Henry Cowan, Viscount Elveden, Mr. Hayday, Sir Robert Horne, Sir William Joynson-Hicks, Mr. MacVeagh, Mr. Munro, Major Nall, Mr. Robert Richardson, Mr. Frederick Thomson, and Mr. Tootill.

Standing Committee A meets this [Tuesday] morning, at 11 o'clock, to consider the Bill.

Committees Appointed.

Committees, to meet to-day, have been appointed for the consideration of two groups of Opposed Bills.

Group F., consisting of Colonel Sir Rhys Williams (Chairman), Mr. Murchison, Mr. Blane, and Mr. Myers, will have before them the Brighton and Hove Gas Bill and the Southend-on-Sea Gas Bill.

Group G., consisting of Captain Starkey (Chairman), Mr. Simms, Mr. Kenyon, and Mr. Mallalieu, will consider the South Metropolitan Gas Bill.

Gas Regulation Bill (Expenses).

The matter of the Gas Regulation (Expenses) Bill was considered in committee last Wednesday. The motion was in the following terms: "That, for the purposes of any Act of the present session to amend the law with respect to the supply of gas, it is expedient to authorize the payment, out of moneys to be provided by Parliament, for two years after the passing of such Act, by way of advance to the extent that may be necessary, of the expenditure of the Board of Trade in the execution of their powers and duties under such Act—such instalments in each case to be repaid in the next three succeeding years."

Mr. BRIDGEMAN (Parliamentary Secretary to the Board of Trade) explained that the resolution was necessary in order to finance the Bill. Under the Bill the Board of Trade had to appoint a chief gas examiner and three gas referees for the whole of the country. At present there was a gas examiner and there were referees, but only for the Metropolitan area. It was proposed in the Bill that the same principle should be extended to cover the whole of the country. At present the London examiner and referees were paid for by funds raised by the Metropolitan Gas Companies. Under the Bill, it was proposed that the expenses and salaries of the examiners and referees should be raised by a levy on all the larger gas undertakings. This levy was not to exceed £15 for every 100,000,000 c.ft. of gas made. If the price of gas was taken at an average of 5s. per 1000 c.ft., this meant an expenditure of 10d. for every £100 worth of gas. The amount, as explained in the "JOURNAL" last week [p. 735], leviable under this clause was based on the quantity of gas produced in 1919, and was estimated at about £32,000. It would not be possible to raise this levy from the gas undertakings in time probably to pay the expenses completely for the first two years of the Bill. All that was asked by the resolution was that the Treasury should advance for two years such sums as were required to pay these expenses, and that the amount should be repaid, with interest, at the end of that time. It was not, therefore, a perma-

nent payment on the part of the Exchequer—it was merely an advance for a period not exceeding two years. The total amount, it was anticipated, would not exceed £20,000.

Sir D. MACLEAN said the smaller gas companies, as he understood it, would be exempt from the levy, which had only to fall upon the larger, richer, and more powerful undertakings.

The resolution was agreed to.

Sulphate of Ammonia Export Question.

Mr. HOUSTON asked the President of the Board of Trade whether, in view of the great importance of the country's export trade and its bearing on industrial and financial prosperity, he could see his way to remove all restrictions on the export of sulphate of ammonia; whether he was aware that the works on the banks of the Manchester Ship Canal belonging to the Salt Union, Ltd., which were specially constructed for the manufacture and export of sulphate of ammonia, have had to be closed-down on account of the restrictions of export; whether he was aware that ample supplies of sulphate of ammonia could be provided to meet all the demands for fertilizers in the country without interference with the export trade; whether he was aware that it was owing to the unfounded fears of the Board of Agriculture that export had been prohibited, and manufacturers of sulphate of ammonia forced to join a ring or association of manufacturers of this article to supply the home market, thereby causing works which produced for the export trade to be closed-down; whether he was aware that the late President of the Board of Trade assured the member for West Toxteth in January and February last that the policy of restriction would be reviewed in the early spring, and the requirements of the export trade borne in mind; and whether he could now see his way to restore this valuable trade by the removal of restrictions?

Sir R. HORNE replied that the restrictions on the export of sulphate of ammonia were imposed at the instance of the Board of Agriculture, and were administered by the Board of Trade on the advice of that department, who were responsible for the maintenance of the supply of fertilizers for agriculture in this country in adequate quantities and at reasonable prices. In view of this and of the introduction in this House of the Fertilizers (Temporary Control of Export) Bill, which has already been passed in another place, he suggested that any inquiries and representations on the subject should be addressed to the Parliamentary Secretary for the Board of Agriculture.

Gas-Mantle Industry and Foreign Competition.

Captain BOWYER asked the President of the Board of Trade whether his attention had been called to the strenuous efforts now being made, against many difficulties, by certain British manufacturers to develop and extend the manufacture of thorium nitrate, incandescent mantles, or mantle rings in this country; whether he had considered the recommendations embodied in paragraph 23 of the interim report on Certain Essential Industries, made by the Committee on Commercial and Industrial Policy, presided over by Lord Balfour of Burleigh—namely, that the manufacture of the mantles was obviously of great importance, especially in respect of efficient illumination and the conservation of coal supplies; whether he was aware that it was estimated that 112,000,000* tons of coal per annum could be saved as a result of using gas-mantles instead of flat-flame burners; and whether, with the object of safeguarding a new enterprise, which might result in the creation of an important national industry, he proposed to take adequate measures to safeguard from unfair foreign competition the manufacturers of the articles referred to?

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board of Trade), who replied, said he was aware of the position of the industries in question, and of their importance as regarded economy of gas. He was not, however, at present in a position to make any statement as to the policy of the Government; but hoped to be able to do so at an early date.

* These are the figures as they appear in the question paper.—Ed. G.J.

Reduction in Price at Blyth.—The Directors of the Blyth Gas Company are in the fortunate position of being able to reduce the price of gas, and have notified their consumers that from the meter indexes which are now being read the charge will be reduced 8d., making the basis price 3s. per 1000 c.ft., less the usual discounts.

Dukinfield Gas-Works Balance-Sheet.—The report of Mr. William Lindley (the Gas Manager) on the balance-sheet of the Borough of Dukinfield Gas Department for the year ended March 31 states that the quality of coal supplied was much better, thereby enabling him to show an improvement in the make of gas per ton of coal carbonized. The make per ton rose from 11,201 to 11,644 c.ft. The sale of gas amounted to 87,250,000 c.ft. which was an increase over the preceding year of 750,000 c.ft. For the past year, the net cost of production per 1000 c.ft. of gas sold, exclusive of capital charges, was 3s. 2·87d., as compared with 2s. 11·25d. for the preceding twelve months. There is on the present occasion a net profit of £1723, as against a loss of £907 a year ago.

Perth (W.A.) Gas Supply.—In the course of the report for 1918-19 of the Perth (W.A.) City Council, it is shown that the total gas manufactured was 122,954,000 c.ft., an increase of 8,442,000 c.ft. over the previous year. The amount sold was 111,460,900 c.ft., or an increase of 12,933,100 c.ft. The number of connections is 4493, an increase of 75, all on existing mains, as no extensions have been made—progress being impossible until the new gas-works now authorized are erected. Great difficulty was experienced during the year owing to coal shortage through strikes and scarcity of shipping. The gas supply was only maintained by using oil, wood, and coke. The grade of gas has been fairly well maintained, though at times there has been complaint, principally due to the poor quality of Newcastle coal received. Arrangements are now in hand for the new plant to be erected at East Perth; but it seems unlikely that construction can be completed in less than eighteen months to two years at best, owing to the great rush of long-delayed work the manufacturers have in hand. With the exception of a few special items, the whole of the work will be done in Australia. The working profit was £11,800, compared with £9652 for the previous year.

LEGAL INTELLIGENCE.

Unsuccessful Claim after a Gas Explosion.

His Honour Judge Greenwell, sitting in the Newcastle County Court, last week heard an action brought by Robert Heron, a joiner, to recover £100 for damage to furniture, &c., caused by a gas explosion in his flat, alleged to have been due to the negligence of the Walker and Wallsend Gas Company. Mr. Meynell (for the plaintiff) explained that the flat was served by a penny-in-the-slot meter. At the beginning of November last, there was a bad light, and complaint was made to the Company, who sent men. They took up the pipe in the street, and asked permission to break-up the garden path. They also "blew" the meter with a force-pump. That night there was a smell of gas in the house, and complaint was again made. Men came and found a leakage upstairs, but did not do anything in Heron's flat. Subsequently, after an urgent note had been sent to the Company telling them the tenants were likely to be blown-up, plaintiff took up a small piece of wood near the door-step. An explosion occurred, and he and his wife were blown into the garden. It was stated that the amount of the damage was admitted. Mr. Mundahl (on behalf of the Company) said this was a singular accident. He did not know quite what was the cause of the explosion. He was advised by gentlemen of some experience that it was probable that it arose from the leakage from a hole which was found in the pipe 15 in. from the doorstep. If that were so, however, he still said that the pipe did not belong to the Company, that they did not lay it, and that it was not under the Company's control. It was in private ground, and without permission the Company could not inspect it. Therefore it was not the Company's fault that the explosion had occurred. Moreover, it was in the highest degree improbable that the men, in blowing-out the pipe, would cause the hole. And if he did, it was not evidence of negligence. There was nothing in the note sent to the Company to show that the matter was of such urgency. The men had been there all the week. After hearing several witnesses (including Mr. John Lewis, the Distributing Engineer to the Company), his Honour found that the Company had not been negligent. Judgment was therefore given for the defendants, who did not ask for costs.

Child's Death by a Street-Lamp.

In the Sheriff Court at Airdrie, proof was taken a fortnight ago in a claim for £500 damages for the death of a child, brought by Arch. M'Dermaid, against the Town Council of Airdrie as Gas Commissioners of the Burgh. The pursuer averred that on Dec. 10 last two of the defenders' servants in the gas undertaking were attending to a Keith light affixed to an electric standard in Clark Street, using for the purpose a tower-ladder wagon. Part of the gear of the Keith light consists of a wire cable running up the outside of the electric standard; the cable being used for raising and lowering the lamp. In driving away the wagon from the standard, the workmen were alleged to have negligently omitted to see that the wagon and the tower-ladder were clear of the lamp and its gear. On being driven away, the tower wagon caught in the wire cable, with the result that it was carried along with the wagon until it snapped, and the lamp fell to the ground. In its fall, the lamp struck the pursuer's child, fracturing the base of the skull; and the child died a few days afterwards from the injuries inflicted. The defenders' insurance agents defended the action, but with a view to settling it they offered the pursuer the sum of £100. This he refused to accept; and the Sheriff had to hear the evidence. His Lordship (Sheriff D. S. Macdiarmid) on Saturday issued his decision. He found that the defenders admitted that the death of the pursuer's child was caused by the fault or negligence of their servants, and that they were liable in reparation to the pursuer. He assessed the damages at £120, with expenses to the pursuer.

Bastia Gas-Works Change Hands.—The gas-works at Bastia, Corsica, are passing from the hands of La Cie. Générale de Lumière et d'Energie to those of Les Compagnies Réunies de Gaz et d'Electricité, at the head of which is M. Th. Vautier. The purchase price for these and the works at La Seyne-sur-Mer (the only two works belonging to the selling Company) is 360,000 frs. in shares in the purchasing Company. The capital of the selling Company was 900,000 frs.

South African Lighting Association, Ltd.—The Directors, reporting upon the accounts for the year 1919, state that the price of gas at Port Elizabeth was further reduced by 5d. from Jan. 1, 1919; and at Grahamstown by 10d., from July 1. As similar reductions took place at corresponding dates in 1918, the receipts for the year by comparison with 1918 are less by 5d. and 10d. at the respective stations for a full twelve months. Satisfactory increases in the quantity sold at both stations have partly compensated for the reductions in price; but increased cost of coal, labour, and materials has contributed in producing smaller profits than those of 1918. The Directors are now carrying out extensive repairs which have been unavoidably deferred during the war, and for which substantial provision has been made. The Corporation of Grahamstown are desirous of providing for a supply of electricity to the town; and the Directors are considering the advisability of erecting works for the purpose, if terms on a satisfactory commercial basis can be agreed. The Company's present concession for lighting in Grahamstown will terminate on June 30, 1924. An interim dividend at the rate of 4 p.ct. was paid; and, after providing £500 to meet depreciation on investments, the Directors now recommend the payment of a further 5 p.ct., making 9 p.ct. for the year—such dividend to be subject to deduction of income-tax at 4s. 3d. in the pound—this being the effective rate after allowing for the amount recovered by the Association in this country in respect of tax paid in South Africa. This payment will slightly reduce the amount of profit carried forward; the balance so remaining being £5855. The meeting is to-morrow [Wednesday].

MISCELLANEOUS NEWS.

BRITISH COMMERCIAL GAS ASSOCIATION.

SOUTH-WESTERN DISTRICT CONFERENCE.

The South-Western District of the British Commercial Gas Association held a Business and Housing Conference at the Pump Room, Bath, on Tuesday last. Sir PERCY STOTHERT, K.B.E., Chairman of the Bath Gaslight and Coke Company, presided.

A municipal welcome was extended to the delegates, in the absence of the Mayor of Bath (who had been called away), by Alderman CHARLES HENRY LONG, an ex-Mayor and Chairman of the Corporation Housing Committee. They were no doubt able, he said, to provide plenty of light; and in the course of what he trusted would prove a profitable conference, he hoped they would be able to shed some light as to how they could reduce the cost, which was the bugbear of the housing schemes at the present time.

Sir PERCY STOTHERT welcomed the delegates on behalf of the Bath Gas Company, pointing out that the Company were the oldest in the district represented. They were 102 years old, and still going strong; and in so far as the price of gas to consumers was concerned, Bath took a very honourable place among its friendly rivals, and was somewhat of an enigma to its competitors.

In his opening address Sir Percy said he took it that the primary object of the Association was an educational one, and to endeavour to try and dispel some of the ancient and somewhat foolish prejudices of a section of the public against the use of gas as a means of light and heat, and to teach consumers how to use gas and its appliances in the most economical and efficient manner. At no time in the history of the industry could this educational propaganda have been more required than during the present period; for the industry was faced with problems of the very gravest issue. In the first place, owing to the unprecedented rates of wages and prices of coal and all commodities required for the manufacture of gas, nearly all gas companies found themselves in an extremely embarrassed condition financially, owing to the various restrictions of their Acts of Parliament, thereby hampering and delaying necessary development and the consequent absorption of labour now out of employment.

He would give one concrete example of this, as concerning his own Company. Coal had increased by 180 p.ct. since 1914; wages in 1914 cost £15,772, and in 1919 £35,357; and all other essential commodities —such as fire-brick goods, oil for oil-gas making, and sulphuric acid for sulphate of ammonia manufacture—had increased from 200 to 340 p.ct. It was to his mind essential that the public and consumers should be informed of these facts; and when it was recollected that the price of gas in Bath had only been raised in the same period by 55 p.ct., some consideration should be given to the management, for their conduct of affairs during this trying and anxious time.

Another subject on which the consumers of gas all required much enlightenment and education was the Gas Regulation Bill now before Parliament, and which if it became law would alter the whole system of payment for gas. Consumers had for decades past become so accustomed to buying their gas by volume, irrespective of its heating value, that the activities of the Association might well be directed to making the advantages of buying gas by heat units perfectly clear and understandable to the consumers.

The character of the population of Bath somewhat tended to conservatism in ideas and to the preservation of ancient prejudices. As regarded the latter, gas came in for its full share; and it was to combat these that they welcomed the assistance of the Association. He looked to the time when all gas companies making above 100 million c.ft. a year should have their own staff of skilled and well-trained experts whose whole time should be occupied in visiting the consumers, and seeing that the gas appliances in houses were being properly maintained and used—even, if necessary, in giving lessons to the cook how to use her gas cooking stove. For smaller companies, he threw out as a suggestion that the Association might have a staff of experts available to be sent down to an undertaking for a few weeks or months as required. It was in the homes where most prejudices existed and where they required attacking and overcoming. He was aware that some companies had already adopted the policy he had suggested, and with great success.

With regard to the question of house-planning, Sir Percy held that there was still much to be done in the way of educational propaganda; and the fight must be continued with ever-increasing vigour. It seemed to him a thousand pities that the Ministry of Health had not set up a thoroughly independent committee of experts to settle, once and for all, the most efficient and economical method of heating and lighting the dwellings of the working classes. Had this been done, he was absolutely confident a unanimous report would have been arrived at in favour of gas. Their experience in Bath with the penny-in-the-slot meter system was that the working classes always preferred if possible to rent a house so fitted up—thus ensuring comfort and coolness to the wife in the hot summer months, and easily regulated warmth in the winter. He need hardly dilate on the purity of the atmosphere, and the health of the inhabitants so obtained, and the pollution of the air and waste by open-grate fires.

Thanks to Alderman Long and the Chairman were voiced by Mr. R. Beynon (Torquay) and Mr. R. Robertson (Bristol).

The Secretary (Mr. W. M. Mason), in the absence of Mr. F. W. Goodenough, the Chairman of the Association, made a statement as to the work and policy of the Association, and Mr. F. H. Holland spoke of the work of the Sales' Organization Department.

After luncheon at the Grand Pump Room Hotel—at which the visitors were the guests of the Bath Gas Company—a conference on housing was held. Mr. S. Fox Andrews presided.

The Secretary presented a reasoned statement of the case for the use of gas in relation to the housing problem; and Mrs. M. A. Cloudesley Brereton spoke from the housewives' point of view.

During the discussion, Alderman C. H. Long expressed the opinion that the time would come when some restriction would have to be put on the wasteful consumption of coal. Some people might say that they could have heat and light from the electric light undertaking. They could; but they did not get any profits.

Mr. A. R. Saxty said if the Housing Committee would be bold enough to do away with coal fines, it would be a great blessing to the housewives.

Mrs. Cordiner (a Labour representative) said she would not for anything go back to the old system with its dirt and dust.

Mr. J. Wesley Whimster stated that the tenants of the new workers' houses in the Dolemeads, where only gas was used, were keenly satisfied with the economy, efficiency, and cleanliness of the system.

In the evening Dr. C. W. Saleeby lectured on "The Coal Smoke Curse and the Nation's New Homes."

YORKSHIRE SECTION CONFERENCE.

Under the auspices of the Yorkshire Section of the Manchester District Committee, a district business and housing conference was held last Thursday, in the Civil Court of the Leeds Town Hall.

At the morning session, the chair was occupied by the LORD MAYOR (Mr. T. B. Duncan), who, in offering a hearty welcome to the gathering, said it seemed to him that the time had arrived when all forces in the country might turn their energies to the prevention of waste. The country undoubtedly was wasting much of its resources. Just as the first duty of the medical faculty was to prevent disease; of the policeman to prevent crime; and of religious leaders to prevent irreligion—so the first duty of the gas or any other industry was to prevent waste, and utilize what they had to the very best advantage. There was undoubtedly waste in the use of gas. At the present day, distance had almost been obliterated. If they studied as to how they could save in all the expeditious services which man had established, they could arrive at a very valuable conclusion. They could save life, save food, and save human energy. They could save for greater production much time wasted both in manufacture and distribution.

Alderman W. PENROSE GREEN, J.P. (Chairman of the Leeds Gas Committee), in his opening address as President of the Conference, endorsed the Lord Mayor's welcome. It was an asset in any corporation gas undertaking that information should be disseminated quickly and readily with a view of at once getting any improvements into use. He had noticed in the gas industry that there was little disposition to hold-back novelties and new ideas. The Leeds gas undertaking was not a small one. They had 1019 miles of service mains; and the leakage, as might be expected, was considerable. They had three large works, two installations of vertical retorts, horizontal machine-fed, the inclined, and the blue-gas plant. The output was 3000 million c.ft. per year, and the coal carbonization 250,000 tons per year. The yield of gas, after the extraction of benzol, was 11,496 c.ft. per ton of coal carbonized. There was a great future in the uses to which gas could be put. He also believed that the make of gas per ton of coal would be greatly improved in the very near future. It might be that some chemist—perhaps some member of the Association—would show how to make gas without coal. Be that as it may, in his opinion the most economical manner of obtaining heat was by gas, because in producing gas they secured also so many valuable bye-products. All these splendid residuals were wasted in the air in the open fire, and helped to pollute the atmosphere. He believed it was largely through the efforts of the B.C.G.A. that the use of gas had advanced so greatly in recent years. Their pamphlets were read widely, and he was sure had fallen on good ground. He looked upon heating and furnace work in gas practice as even yet in its infancy and capable of immense development. He wished the conference every success.

Mr. F. W. GOODENOUGH (Chairman of the Executive) expressed, on behalf of the Association, warm thanks to the Lord Mayor for his welcome. He also thanked Alderman W. Penrose Green and the Leeds Gas Committee for having made it possible for them to hold the meeting—the first the Association had held in Leeds. The aims and objects of the Association were well known. They were out to increase the use of gas to the mutual benefit of both buyer and seller, recognizing that the "square deal" was the only true basis of successful business. The gas industry was a great help in the economy of fuel and the conservation of coal—not, as the Coal Conservation Committee of the Ministry of Reconstruction rather led the country to believe, by the use of electricity as a fuel, in which direction lay waste—but in the true sense of economy and the utmost utilization. He said this fresh from a meeting of the Institution of Electrical Engineers, where it was freely admitted that the field of heating was held by gas, and could not possibly be held by electricity. The B.C.G.A. was not an anti-electricity organization. All it was out for was truth. They were out for truth when they had occasion to correct misconceptions by politicians—because these were held chiefly by politicians and not by electrical engineers. The gas industry could help in the solution of the labour problem, because anything which conserved the use of coal diminished the amount of labour required in production; and transport of coal served this useful purpose. Gas materially helped any industry to increase and improve output, which was the bottom card of to-day's problems.

The gas industry could help directly in financial economy as well as in economy of fuel and labour. It could help, again, in the economy of that most precious asset, public health, by the improvement of the atmosphere and the diminution of laborious and irksome labour. It was a public duty of all gas undertakings to take every possible step to increase the use of gas. Sir Dugald Clerk had recently suggested before the Institution of Gas Engineers that there was no reason why the consumption of gas should not be doubled within the next ten years. He thought they would all agree with this; but the way to do it was for every undertaking to give constant quality and constant pressure. There must be good service to the public, both inside the office and the works and outside on the district. The consumers' point of view must always be studied and duly regarded. The grumbler must not be regarded as a nuisance, but as an opportunity to create a satisfied user and so get more business. In his own undertaking, they found that they could get more business out of complaints than from

almost any other opportunity. The industry must do everything possible to educate the consumer in the economical use of gas. That necessitated not merely publicity work but the possession of a highly-trained staff. How many business people—indeed, how many gas managers—realized that there were nearly 400 separate uses of gas in industry? This was where the B.C.G A. came in to serve the industry. He had been delighted, the other day, to hear one of the professors of the Leeds University—a member of the Coal and Smoke Abatement Committee of the Ministry of Health—say that the Association's publicity campaign was generally appreciated by scientific men, because they had never seen a statement by the Association which could not be proved. Already the Association had the support of 82 p.ct. of the gas industry; but they needed the support of 100 p ct. In publicity, a great deal of attention had been devoted to publications appealing to doctors, architects, and teachers, because of the enormous influence these professions had upon the people. One of the latest developments was the production of cinematograph films of an interesting and effective character. As the industry recovered its normal position when the new Bill was through, and they could settle down to less disturbing conditions, the publicity campaign of the Association would be greatly extended. In his own Company, they had saved 10 p.ct. on their distribution wages as a result of putting into operation the Association's schemes. This involved a saving of £30,000 per year; so it was easy to see how valuable were the services of the Association to the members of the industry.

Mr. W. M. MASON (the Secretary of the Association) gave facts as to the Association's work and achievements. One of the most harmful ideas which had ever obtained in the gas industry was the old one—an idea which was held by some gas engineers to-day—that the profits were made in the retort-house. It was the biggest of myths. Cheap gas, *plus* bad salesmanship, was of no use. They were not going to sell a thing merely because it was cheap. There were plenty of things which could not be given away. They must have with the cheap gas good salesmanship and good service.

Mr. F. H. HOLLAND (Director of Sales Organization) outlined the Association's scheme of organization on the sales' side. He said a week ago he received a return from an undertaking which had adopted the Association's scheme. Since the commencement of the scheme the manager had secured £8 worth of business per day per man employed. In a corporation department which had to work against great handicaps due to local regulations prohibiting the sale of fittings, &c., they had secured 8·9 p.ct. of new business since adopting the scheme. The scheme involved no extra staff and no special super-man to carry it into effect. Under the Association's system in one undertaking 30 men were now doing as much work as 36 did six months ago.

No questions being asked from the audience,

Mr. GOODENOUGH proposed a vote of thanks to the Lord Mayor and Alderman Penrose Green for their attendance, and to Mr. Shapley (Leeds City Gas Engineer) for his organization of the meeting.

Mr. W. B. M'LUSKY (Halifax Borough Gas Engineer), seconding, said he thought it would be a good thing if the Association could have the remarks of the Lord Mayor and Alderman Penrose Green printed for wider circulation. They of the North were indebted to the gentleman who had come from the South to give valuable information.

The proposition was carried, and the Lord Mayor and Alderman Penrose Green briefly responded.

At the afternoon sitting—Alderman PENROSE GREEN presiding—Mr. C. S. SHAPLEY read a paper on the "Housing Problem from the National, Commercial, and Industrial Point of View." Mr Shapley said it was particularly desirable that there should be an extended use of gas in the new housing schemes, in order to help to abate the smoke nuisance. Gas helped to promote building economy and increased the residential value of property. There was never a better time than the present for a change in the old methods of house equipment. In the equipment of houses with gas appliances, the gas authorities ought not to be saddled with the responsibility of installation free of charge, because, in view of the new schemes being largely in areas outside the town areas, the provision of extensive mains would be a costly business. If local housing authorities would instal gas-cookers, &c., of a type approved by the gas experts, the gas undertakings would, in all probability, relieve the housing authorities of any further responsibility in the matter of upkeep and renewals. He was glad to know that gas-coppers were being installed in the new houses being built by the Leeds Corporation.

Mr. GOODENOUGH said he believed the communal interest in the increased use of gas instead of coal was perfectly obvious. Architects had calculated that by the installation of gas heating £30 could be saved on the building of each house; and this, carried into effect generally, would mean a saving of £30,000,000 on the total number of houses required.

The CHAIRMAN said the visit had come at a time when they were all anxious to learn something more about gas, and it should have an advantageous effect on the adoption of gas in new housing schemes.

Mr. R. WATSON (Doncaster) said it was anticipated that, if the houses to be built were supplied with gas appliances, the old houses would quickly have to have them also, to satisfy the tenants. The gas industry were very much handicapped by the elimination of gas for lighting for the smaller houses. Where both gas and electricity were to be installed, it was a very great question as to whether it was a paying proposition to either of the services. He had in his own area cases in which he was asked to put in a gas wash-boiler and one light in the scullery, and nothing else. In such cases, there was probably a loss on the business at present rates of interest and sinking fund and other costs. The gas industry were prepared to supply a good service; and if they received some encouragement to put gas in the smaller houses for lighting, it would be to the benefit of the country at large.

Mr. W. B. M'LUSKY said he could speak first-hand as a gas consumer, as well as a gas engineer. His own house had had no coal for five years. During these five years his gas bill, calculated at the present price of gas, amounted to 1s. 9d. per week for cooking all the

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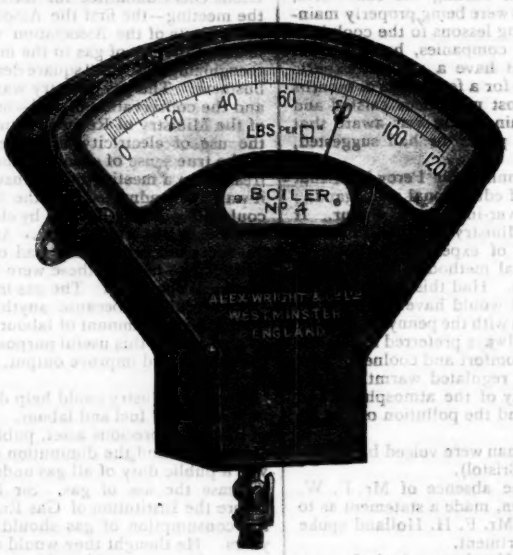

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food for six persons, 9d. per week for lighting the house (of eight rooms), and 7s. 6d. per week for heating all the rooms by gas-fires. The gas bill for the past year was £26, and in pre-war times, at pre-war prices, with coal as well as gas, the bill was £22. At his house they had not gas for water heating; they had what was called the "London" coke-boiler. In the depth of winter it used 5 cwt. of coke per month. The boiler was only in use from 7 a.m. to 2 p.m.; but they could have a hot bath next morning at 6 o'clock, because the boiler was under perfect control. One great advantage of gas-fires was that they were lighted and extinguished just at the times they were required, and were not burning unnecessarily, like a coal-fire. One could get from a modern gas-cooker quite 4 p.ct. more heat energy than was possible twelve months ago.

After further discussion,

Mr. SHAPLEY, in reply, said the smokeless city undoubtedly was going to be the thing of the future, and gas was going to play a great part in its creation.

Votes of thanks to Alderman Penrose Green for presiding, to Mr. Shapley for his paper, and to the Leeds Gas Committee for the facilities they had extended for holding the meeting, concluded the proceedings.

BRIGHTON GAS COMPANY'S BORROWING POWERS.

There was a special general meeting last Thursday afternoon, at the London Offices, Great Winchester Street, E.C., of the Brighton and Hove General Gas Company, for the purpose of amending a resolution passed at a previous special meeting, which authorized the Directors to raise additional capital.

The meeting was presided over by the Chairman of the Company (Mr. A. M. Paddon), who explained that the procedure was of a purely formal character. It would be within the recollection of the proprietors that a special meeting was held on May 9, 1919, at which there were conferred upon the Directors powers required to deal with capital to defray the expense of re-organizing the works and generally carrying-on the business of the Company. Much had happened since then; and it would be quite impracticable, with the wholly changed conditions of finance that existed to-day, to give proper effect to the intentions of the proprietors as expressed on the occasion to which he had referred. This was so obvious that it had appealed to Parliament, who had passed an Act to meet the difficulties, and the impossibilities, that had accrued in the interim, and to confer powers upon the gas industry, among others, in the matter of the raising of capital. All that had to be done was to bring the powers granted at the previous meeting into conformity with the regulations imposed by the Government by the provisions of the Public Utility Companies (Capital Issues) Act. There was no change whatever in the position of the Company; and the Directors had no choice in the matter. They must simply ask the proprietors to re-enact the resolution already passed, thus enabling them, in carrying it out, to avail themselves of the machinery set up by the Government in the new Act. The whole point was that the Government had to give them new conditions on which to issue the stock.

The Secretary (Mr. E. L. Burton) then read the resolution submitted, which was to the effect that, for the words "entitled to such dividend, not exceeding the rate of 6 p.ct. per annum, as the Directors may determine at the time of each issue" should be substituted such dividend as the Directors may determine, and as may be approved by the Board of Trade pursuant to the provisions of the Public Utility Companies (Capital Issues) Act, 1920. Further, that the sum of £32,080 which the Directors were authorized to borrow be altered to £230,892 (whereof borrowing powers to the extent of £19 700 have since been exercised under the authority of the resolution, reducing the sum of £230,892 to £211,192). That the amount of £19 700 of 7 p.ct. redeemable debenture stock issued already this year, and any further issues authorized by the resolution, shall rank with the existing 5 p.ct. and 4 p.ct. debenture stock; that, subject to the terms of any special resolution of the Company that may be passed hereafter, affecting the issue of such stock as at the time of the passing of such resolution may be unissued, the debenture stock authorized to be issued shall be redeemable at par within a period not exceeding ten years; and that the rate or rates of interest payable thereon shall be such as may be determined by the Directors and approved by the Board of Trade pursuant to the provisions of the Public Utility Companies (Capital Issues) Act. That the Directors be empowered to pay off such redeemable stock, or any part, at £100 for every £100 of stock at any time before the date fixed for redemption, subject to the consent of the holder; to redeem it, subject to consent, by issuing other stock in substitution for it, and for the purpose of providing the necessary money to create new redeemable or irredeemable stock, or re-issue stock.

The resolution was carried unanimously, without discussion; and the proceedings ended.

DOMESTIC SMOKE.

THE DAMAGE DONE, AND HOW TO AVOID IT.

[COMMUNICATED.]

There are two main sources of air pollution by smoke—industrial and domestic. It is with the domestic aspect of the smoke question, in particular reference to the present housing situation, that a short interim report, now published, from the Ministry of Health Committee on Smoke and Noxious Vapours Abatement, is concerned. The report briefly describes the amount and character of domestic smoke. It appears that domestic soot contains a higher percentage of carbon and

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tar than factory soot, and is therefore more obnoxious and adhesive than the latter.

At least half the total output of smoke is domestic, and at least 6 p.ct. of the coal ordinarily burnt in domestic grates escapes as soot. Taking 40½ million tons as the amount of coal burnt annually in the United Kingdom in its natural condition for domestic purposes, the loss amounts to nearly 2½ million tons of soot—*i.e.*, waste fuel—per annum. The yearly domestic consumption of crude coal in the Metropolitan area is only 4¾ million tons. So that the amount of fuel wasted throughout the country every year would warm all London for at least six months. Instead of this, it escapes into the air as soot, and befouls everything it touches.

The various aspects of the damage done by impurities in the atmosphere are briefly summarized. Health, agriculture, and building materials are all most seriously affected. Some interesting photographs are reproduced to illustrate the effect of smoke and its concomitants, sulphuric and sulphurous acids, on such well-known buildings as the Tower, the Houses of Parliament, Chelsea Hospital, and Somerset House. The total bill of damage done by smoke is indeterminate; but the report quotes the figure of £4 per head of the population per annum, which, as the result of an exhaustive inquiry conducted by a Committee of Experts in 1912 in Pittsburgh (U.S.A.), was estimated as the cost of smoke in that city. It appears, moreover, that in regard to the weekly wash, Manchester—a smoky town—pays over a quarter-of-a-million a year more than it would pay if it were as clean as, for example, Harrogate.

There is no law forbidding the burning of raw coal; and there are a million new houses to be built during the next few years. The Committee realize that "Prevention is Better than Cure." They feel strongly that the new houses must not perpetuate the smoke evil—"a unique opportunity for constructive reform" must not be lost. Accordingly, the Committee have investigated various ways in which heat can be supplied to the new houses smokelessly—that is to say, without burning raw coal in domestic grates.

The merits and demerits of coke, gas, electricity, central heating, and a central supply of hot water are discussed in the report; the Committee being guided throughout by three main questions—(1) whether the schemes suggested were practicable, (2) whether they were hygienic, (3) whether they were relatively economical. In one scheme investigated by the Committee there was an initial structural saving estimated at £30 per house effected by the substitution of smokeless for old-fashioned methods. This was not a mere paper scheme, but is in actual operation at Northfield, near Birmingham. But, as the report points out, even supposing it should cost a little more to avoid smoke, it is surely worth while. It is admittedly worth while to spend a little extra in order to build only a limited number of houses to the acre; and it is without doubt equally important to avoid the production of smoke. Besides, even on a purely cash basis, any extra cost should be more than counterbalanced by the gain effected by the elimination of smoke.

The Committee are not wedded to any particular scheme of domestic heating as universally applicable, but show that practicable hygienic and economical methods are available for supplying the requisite heat; and they recommend that sanction to housing schemes submitted by the Local Housing Authorities or Public Utility Societies should be conditional upon the provision of smokeless methods of heating as suggested in the conclusions of the report, which are as follows:

We are satisfied that means which produce little or no smoke are available and practicable for cooking, heating water, and warming rooms. Certain general conclusions emerge from the data before us, which we may usefully summarize.

1.—The witnesses whom we have heard have almost without exception condemned either explicitly or implicitly the old-fashioned kitchen-range and back-boiler as inefficient, wasteful of fuel and labour, and productive of smoke. Subject to the opinion previously expressed with regard to the future possibilities of electricity as a heating agent, we think that, wherever a supply of gas is available, a gas-cooker should be installed in lieu of a coal-range.

2.—The cheapest and most efficient method of providing a supply of hot water, where a central supply is not practicable, is by a coke-fired boiler.

3.—A central hot-water supply for detached houses, where practicable, is a desirable system, if it can be provided at a moderate cost. Practical experiments in this direction are urgently needed, and should be given every encouragement.

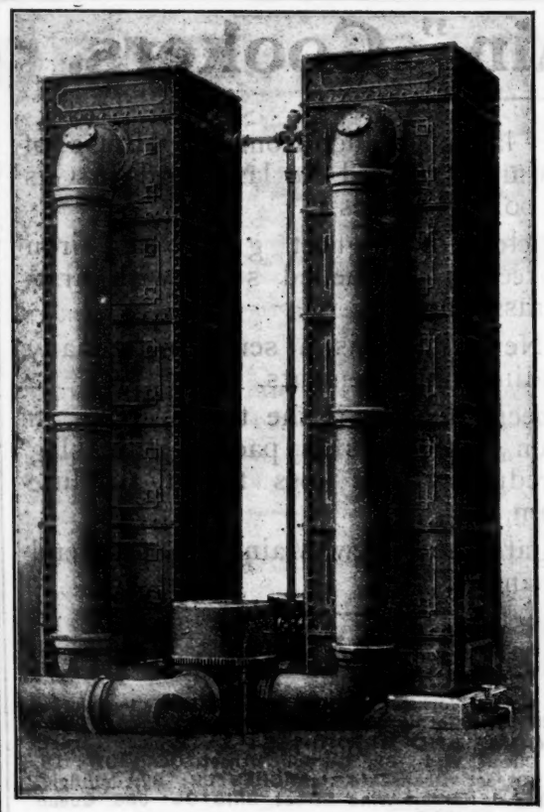
4.—For tenement houses, a central supply of hot water is quite practicable, and should be provided universally.

5.—The system of installing separate central-heating plants in each house heated by coke or anthracite should be employed far more widely than is at present the case.

6.—As far as practicable, gas-fires or hot-water radiators (or electric radiators, subject to the question of cost) should entirely supersede the old-fashioned open coal-fire, adequate means for proper ventilation being provided.

7.—We are aware that there is still a strong prejudice in many quarters in favour of an open coal-fire; and we therefore limit our recommendation to this extent—namely, that in none of the houses built with the assistance of the Government subsidy should more than one, or, in exceptional circumstances, two, coal-grates be installed. Wherever coal-ranges and coal-grates are installed, they should be of a type adapted to the use of coke as well as of coal. Adequate means of regulating the draught should in all cases be provided.

With regard to the question of domestic heating in general, we are struck by the absence of full and scientific knowledge. We think that the whole subject of hygienic and scientific heating deserves a very much greater measure of public attention than it has hitherto received.



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THE SOLUTION OF INDUSTRIAL DIFFICULTIES.

Labour Co-Partnership Association Meeting.

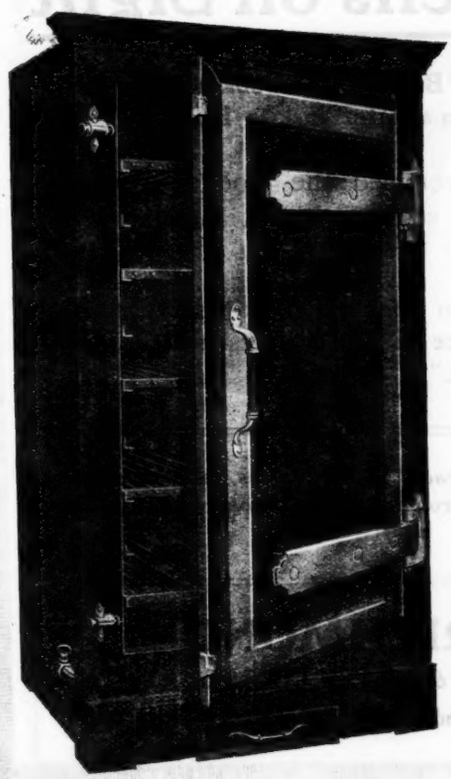
Some staunch believers in co-partnership as a means of solving industrial difficulties spoke from the platform of the Council Chamber at the Guildhall, E.C., last Wednesday afternoon; the occasion being the annual meeting of the Labour Co-Partnership Association, at which there was a large and interested audience.

The Right Hon. Lord ROBERT CECIL (Joint President), who was in the chair, said it was many years since he became personally convinced that in co-partnership, properly understood, was to be found the best solution of industrial difficulties. Taking a general view of industry, at any rate as it appeared to an outside observer, he should say undoubtedly the present position was one not free from rather grave anxiety, though there were, of course, many firms who were working perfectly amicably with their employees. As the existing system was not working smoothly and satisfactorily, he felt very strongly that it was the duty of everyone who had any interest in his country's welfare to do his best to find a solution of the difficulties. No doubt they had a good deal further to go before they reached a real solution; but he wished to insist that co-partnership did not mean a cast-iron system which was to be applied to every industry. It was a recognition that employers and employees did not belong to different and hostile camps, but were true partners in one great enterprise. What the Association were striving for was to translate into practice this spirit. Co-partnership schemes had been increasingly adopted; but they were not identical. Each industry had its own problem, and must work out for itself the particular form of co-partnership which was desirable for it. He was often asked what was proposed. No doubt a little might be done by legislation—not in the nature of compulsion, but of removing any technical obstacles that might exist in (for instance) statutory industries, and which might otherwise prevent the adoption of co-partnership. But a good deal more than this might be done. The Government might give a lead in the matter. They might, where they were temporarily or permanently in control of an enterprise, consider whether they could not adopt co-partnership as a means of carrying on the industry in the future. They might also set up the necessary administrative machinery, in an appropriate department, to investigate the applicability of the principle to the various industries, and to be prepared, if asked, to give advice and assistance in the establishment of co-partnership. There were certain very difficult problems in connection with co-partnership which required careful consideration. Some people believed co-partnership would be hostile to trades unionism; but the supporters of the Association were most anxious that this should not be the case. An expert inquiry to see what measures could be taken in the application of co-partnership to make quite sure of not injuring trades unionism was one of the things a Government Department might very usefully undertake. Most of all, what he did wish was that the Government would help to bring this question more definitely and clearly into the field of industrial politics.

An address followed by Mr. W. A. APPLETON (Joint President of the Association and Secretary of the General Federation of Trade Unions); and then Sir GEORGE S. GIBB, LL.B. (Consulting General Manager of the North Eastern Railway) made a few remarks, in the course of which he declared that the mutual agreement between the owners of capital and representatives of the workers offered the best hope of that co-operation which was both economically and socially essential—some definite system of co-partnership which would be acquiesced in by all concerned. Mere profit-sharing—though it was a good thing, and should be encouraged—was not by itself enough. They must go a step further towards full co-partnership. Wage-earners were justly entitled to an effective voice in the general conduct of the industry in which they were engaged, provided that the authority of the executive and the discipline of the staff were properly maintained. Capital and labour could surely unite in achieving the fundamental necessity of cheapening the cost of commodities by increasing production.

Dr. CHARLES CARPENTER said that his only qualification for addressing the meeting lay in the fact that for twenty-two years he had been associated with an undertaking practising co-partnership, which began thirty years ago with a scheme of profit-sharing. In listening to what had been said that afternoon, it occurred to him that it had not been made perfectly clear just what sort of person was meant when they spoke of a co-partner. What was the type that they had developed by the system of co-partnership which his Company had practised for so considerable a time? The war had given them an opportunity of applying tests which would not be practicable in ordinary circumstances. Before the war, when he had spoken from time to time about the value and advantages of co-partnership, he had often been faced with the remark: "That is all very well. First of all, you are a gas company"; and, secondly, of course your men would be content as long as they get a substantial bonus. But wait until you get hard times, and then you will see how all these supposed advantages will fall away." Well, the war had put them into a position to answer questions of this character, in a manner which must otherwise have been impossible. In the first place, he would like to give the meeting some idea of the number of the Company's employees. There were on the outbreak of war something like 6620 employees; and of this number, 2200 served in His Majesty's forces, which was as nearly as possible 33 p.ct. He would like his hearers to picture in their minds exactly what this percentage meant. One-third of the total number of male employees in the undertaking—not an ordinary undertaking, but an undertaking upon the employees of which the authorities showered badges and labels, and things of that kind, so that they should not be called upon by the recruiting officer. Despite these badges, one-third of the men enlisted in one or other of the Services. Now, he would just like to say a word with regard to those left behind. In the first week after the declaration of war, a committee of

CANTEEN APPARATUS.



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Front Frame and Door made of cast-iron with polished mouldings, Sides and Back made of strong plate steel with angle iron corners.

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these co-partners got together and organized a war fund, the object of which was to supplement what were at the beginning the inadequate allowances made by the Government in respect of the dependants of those who were fighting the country's battles. As he had said, this fund was organized during the first week of the war; and at the close of the war the total reached over £130,000. This money was contributed very largely by voluntary contributions—varying from a few pence at the beginning to 2s. 6d. a week. This was a self-imposed tax to help those who were fighting. [Applause.] The fund was administered by committees who took upon themselves the responsibility of making themselves familiar with the circumstances of each case; so he thought it was one of the few funds of which the full value was obtained by those for whom it was intended. The last duty of the fund would be to provide for those who had been left behind, either as orphans or as widows. He had mentioned how the Government had showered badges on the Company. A committee of co-partners got together, and went through the whole of the men who were still at their ordinary work and were of military age. They sorted them out very carefully; and they let a very large proportion of them be aware of the fact that they were not indispensable, and were perfectly well able to undertake their share in defending the country. The Company's deficiencies of labour were very largely made-up by women substitutes; and the training of these women would not have been possible without good-feeling and good-fellowship on the part of those left behind. So far from throwing obstacles in the way of female employment, everything possible was done to facilitate their work. These were very good examples, which would enable his audience to form some idea of the co-partnership product. One other thing. During the war period they had had no strike, nor any semblance or possibility of a strike; and he did not think there were very many organizations that could say this. It would be admitted that people of this kind were worthy of consideration, worthy of encouragement by the State. In other words, if the State as a whole could be so peopled, the country would be better than was the case to-day. This had been brought about by co-partnership, which he would explain in a few words. In the first place, it was necessary to pay the equivalent of a living-wage for capital; secondly, it was necessary to provide the worker with his equivalent of a living-wage; and, thirdly, it was necessary to remember the consumer—too often forgotten in these times—by fixing a fair price for the article with which he had to be provided. Having settled this, if in any period of working there was an excess, the excess was divisible in the proportion of three-quarters to the consumer in lowering prices, and the remainder in an agreed ratio between capital and labour. This seemed to him to be an exceedingly simple principle; and it was practically the one—though not exactly—on which the South Metropolitan Gas Company had been working for a long time. They were doing something more than this. They had interested their employees in the organization of the business. The average workman was ignorant of the principles on which industry was founded; but the great bulk of his Company's men would be able to answer intelligently any questions on this subject that might be put to them. They also took an interest in manufacturing operations, some of them even criticizing developments which the Company had made in one direction or another. Criticism of this kind was welcomed, and was never turned-down. One other testimony they were continually getting from the consumers, who told the Company that the kind of people who were waiting upon them to satisfy their wants were an altogether better class of men than those to whom they were generally accustomed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June* 21.

There is little of additional interest to report in the London tar products market. The season for pitch shipments is practically over; the price remaining at previous quotation. All other tar products remain unchanged.

Sulphate of ammonia for the home agricultural trade is £23 10s. per ton for June and July delivery, on the basis of 24¾ p.ct. ammonia with a 10s. per ton allowance to dealers.

Tar Products in the Provinces.

June 21.

The average values for gas-works products during the week were: Gas-works coal tar, 94s. to 99s. Pitch, East Coast, 160s. to 165s. per ton f.a.s.; West Coast—Manchester, 140s. to 145s.; Liverpool, 140s. to 145s.; Clyde, 145s. to 150s. nominal. Benzol 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 1s. 7¼d. to 1s. 8¼d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 11½d. to 1s.; salty, 10½d. to 11½d. Heavy oils, in bulk, North, 1s. to 1s. 0½d. Carbolic acid, 60 p.ct., 4s. to 4s. 1d. Naphthalene, £35; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 9d. per minimum 40 p.ct.; "B" quality, nominal.

Manchester District Tar Prices.

The average price realized for the sale of tar, according to the sliding scale, for the months of April and May were: April, £6 5s. 2·87d.; May, £6 12s. 8·15d.

The Cooker that Sells on Sight

The remarkable selling power of the "Bungalow" Cooker is emphasised in the following extract from a letter just to hand.

"We have not advertised the Cooker yet, as the whole lot were sold within a few days of delivery.

I congratulate you on the excellence of the finish and general appearance of the Cookers, which seem to appeal to the Public."

The "Bungalow" is made in five sizes, and a series displayed in your Showroom will be "sold within a few days of delivery."

The RICHMOND

GAS STOVE & METER CO., LTD.,

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FROM A MARKET CORRESPONDENT.

Tar Products.

There is practically no definite change in these markets. Buyers seem to be rather nervous, and inclined to limit their operations—a tendency brought about by the policy of banks restricting credits, and depression in other directions. Pitch is unaltered. Sellers are very firm in their ideas for prompt and forward trade; and the autumn demand probably justified this attitude. Crude tar is rather better in sympathy. Creosote is in request. The American demand is heavy; and shippers are making the most of the situation. Such important shipments have taken place lately that there is now no likelihood of any unsaleable surplus. Solvent naphtha is a little stronger, on better export business; sellers asking up to 3s. 6d. per gallon. Naphthalenes are firm and scarce. Pyridine is available in small lots only, and values are a matter of negotiation, ranging from 20s. to 25s. per gallon. Carbolic acids are firmer and rather dearer, in spite of a falling-off in trade with Japan. Intermediate products are still in strong demand. Aniline oil and salts are much wanted at 1s. 9d. and 2s. per lb. respectively, and the former is expected to advance further. A few export licences for the salts have been granted lately.

Latest quotations are as follows:

Benzol: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 87s. 6d. to 90s.; Midlands, 85s. to 87s. 6d.; North, 85s. to 90s. per ton *ex* works. Refined tar, 65s. per barrel (free) on rail.

Pitch: London, 165s. per ton; East Coast, 160s. to 165s. per ton; West Coast, 157s. 6d. to 165s., with Manchester 160s. per ton, and Glasgow 160s. per ton; South Wales, 170s. per ton.

Solvent Naphtha: London, 3s. 6d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined, £45 per ton nominal; inferior, £35; crude, £14 to £22, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 4s.

Creosote: London, 1s. 1d. to 1s. 2d.; North, 1s. 1d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 8d. to 1s. 9d. per lb., drums extra.

Aniline Salts: 1s. 10d. to 2s. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 3d. to 5s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. 8d. per gallon; crystals 40%, 1s. 5d. to 1s. 6d. per lb. (nominal).

Salicylic Acid: Technical, 3s. 0d. to 3s. 3d.; B.P., 3s. 9d. per lb.

Sulphate of Ammonia.

Home demand has remained very light so far; but the fact is worth noting that requirements for August have already been covered in some quarters at the schedule price of £24 per ton, as fixed for that month. A great quantity of sulphate will undoubtedly be wanted in the coming season; and though prices may look dear when compared with pre-war figures, they are cheap in contrast with export quotations. There is plenty of inquiry for export; and the terms mentioned in that direction have shown further stiffening-up to about £45. The loss in export business as compared with 1913 is still over 100,000 tons; but there is not much prospect of the falling-off being made good for some considerable time, although the developments which are getting under way in synthetic ammonia may eventually have an important bearing upon the export trade.

News from America is to the effect that, while sulphate of ammonia continues in a firm position, there has been an easier feeling of late, with some weak operators offering concessions. Such demand as has appeared has been mostly for immediate export. Buying has ceased for shipment to Japan; but good orders have been executed for shipment to Spain.

Lamplighters' Holiday Week.—During this week, no street-lamps are being lighted in Sheffield. The reason of this is to allow the lamplighters to have their annual holiday.

Coventry Gas-Works Profit.—The Coventry Corporation Gas Department report a profit on the year's working to March 31 of £15,556. From this £12,496 has to be deducted in respect of capital expenditure defrayed out of revenue, reducing the amount to £3060; but with the balance of £35,113 brought forward from 1919, there remains a disposable surplus of £38,173. The Committee recommend that £3000 be paid over in aid of the rates, and the balance carried forward.

Wages at Bradford.—The Bradford Corporation have agreed to the Provincial Industrial Council's recommendation for 1s. 6d. per hour minimum to be paid to general workers, with a guaranteed full week of 47 hours. The employees, including gas workers and street sweepers, are dissatisfied with their remuneration; and the War Wages Committee last Wednesday had before them an application for 1s. 8d. per hour for labourers. A Sub-Committee will go into the matter, and submit the findings to the full Committee.

Melbourne Gas Strike.—Cabling on Monday of last week, Reuter's correspondent said that Melbourne streets were in darkness in consequence of the gas-workers' strike; and the unions were threatening that the railways would be involved if coal was conveyed to the gas-works. Later the City Council notified a proposal to grant the electricians an increase in wages of 3s. 6d. a day; and the strikers connected with the electricity supply agreed to resume work. The strike of employees of the gas companies still continued; but the companies stated that they had ample volunteer labour, and the position was steadily improving.

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NEW ALL-CAST
BOILER

completely meets the need of a serviceable and strongly-made apparatus at a moderate price. It has an outer case of cast-iron and a cast-iron pan, which is treated by a special process as a protection against rust. A surrounding flange sloping inwards prevents water running over to the floor and drains it back to the Boiler. The Boiler has a wooden lid which can be used for carrying hot clothes, and inverted for use as a table where space is limited.

ARDEN HILL & Co
"ACME" WORKS, BIRMINGHAM

Gas Undertaking of the Plymouth Corporation.—The accounts of the Plymouth Corporation gas undertaking for the year ended March 31 show a gross surplus of £18,791, and a net loss of £2519 submitted. The deficiency is to be made good as follows: From the reserve fund, £1084; from the district fund (to be repaid out of the future revenue of the undertaking), £1435.

Report on the Salford Gas Undertaking.—The Gas Committee presented last week to the Salford Town Council a report on the gas undertaking which the Council adopted. It had been previously decided to await this report before proceeding with an inquiry authorized by the Council in October last. Mr. Greenwood had previously submitted a resolution to constitute an Inquiry Committee; and this was rejected by a substantial majority. The report, which dealt with the operations of the undertaking over the past 22 years, stated that within this period there had actually been contributed to the rates £512,659. If Salford had contributed in the same proportion as Manchester, the sum would not have been over £320,744.

Increased Gas Output at Belfast.—The report of Mr. J. D. Smith, the Engineer and Manager of the Belfast gas undertaking, which was submitted to the Gas Committee last week, shows that the gas manufactured in the twelve months to March 31 last amounted to 3053 million c.ft., being an increase of 389 million c.ft. over the corresponding period of the previous year. Offers had been accepted for the erection of a new plant, which it is hoped will be in operation during the latter part of next winter.

Municipal Gas Undertakings in New South Wales.—The report of the Local Government Department of the New South Wales Legislature for the year ended June 30, 1919, states that there are 21 municipal gas undertakings, seven of which sold gas at less than cost price. The largest loss per 1000 c.ft. of gas was incurred by the undertaking at Molong, which has been an unprofitable concern for some years. Sixteen of the undertakings show a net return on the capital invested; the highest being 7·29 p.ct. An interesting feature of the undertakings is that three of them have no loan indebtedness.

STOCK MARKET REPORT.

THE Stock Exchange opened last week a good deal under the rather chilling influence which marked the close of its predecessor, and for the first two days things were quite dull. But soon a more cheerful tone succeeded; and this was happily maintained up to the close. There was less apprehension in regard to fiscal and financial questions, and some were even sanguine enough to back the chances of a reduction in the Bank rate. However, in result, markets generally were firmer.

The gilt-edged market profited to a fair extent. Home Government issues, after a preliminary hesitation, made some advances; and Friday's figures compare advantageously with the week before—viz., Consols 47-47⅛, War Loan 85⅛-85 5/16, Funding 69⅜-70⅛, Victory 77-77⅛. Bonds, too, showed strength, and some Municipals advanced. Home Rails, after a bad start, took a turn for the better, and finished in good case. Canadians were irregular; but Argentines made some moderate advances.

The Foreign Market was variable. An improvement in the value of the franc gave French Loans a welcome hoist, and Greeks were inquired for; but Chinese, Japanese, and Brazilian were easy.

In the Miscellaneous Market, Rubbers were in better demand, and Oils on the whole were firmer; but Nitrates, Shipping, and Insurance were easier.

Business in the Gas Market was a good deal quieter, and prices in general drooped a little for lack of support. Possible buyers seem more disposed to be frightened by threats of a strike than encouraged by a Financial Relief Bill. In the London Companies, Gaslight ordinary fell 1, and South Metropolitan 2. In Suburban and Provincial, South Shields fell 3½, and some debenture issues lowered. Imperial Continental and Primitiva were both unchanged. Malta and Mediterranean will pass the next dividend.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 52, 53, 53¼, 53⅜, 54½, ditto maximum 37, Primitiva 17s. 6d., ditto debenture 70, South Metropolitan 54⅛, 55, 56½. On Tuesday, Continental Union preference 40, Gas Light ordinary 52½, 52⅝, 53¾, ditto maximum 40,* Imperial Continental 126½, 127, South Metropolitan 53, 53⅛, 54⅛, 55, ditto debenture 47. On Wednesday, Brentford "B" 46, Continental Union 29⅝, European 5⅜, 6, Gas Light ordinary 52½, 53, 53⅜, ditto maximum 39, ditto preference 57½, Imperial Continental 125, 126. On Thursday, Brentford "B" 47, Cape Town 7⅞, 7⅝, Gas Light ordinary 52½, ditto maximum 40, Imperial Continental 125, 125½, 126, 126⅜, 127, Newcastle debenture 53, South Metropolitan 53, 54⅛, South Shields 100, South Suburban debenture 73. On Friday, Brentford "A" 49⅛, ditto "B" 46⅜, 47½, Brighton and Hove "A" ordinary 80, European 5 13/16, 5 15/16, 6, Gas Light ordinary 53½, ditto preference 56½, ditto debenture 46½, Imperial Continental 125, 125⅛, South Metropolitan 53½, 54⅛.

In the Money Market, conditions on the opening day were steadier; but as a large and increasing supply progressed, so rates became extremely low. Discount business was quiet, and terms were steady. Silver fell to another record figure (44d.) and then jumped up to 49⅛d. The Bank rate is 7 p.ct., as fixed on April 15.

The Reading Gas Company have placed a contract for an installation of Glover-West vertical retorts, together with the necessary coal-handling machinery, foundations, &c.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	58—63	...
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	37—42	...
374,000	,,	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	57—62	...
280,000	5	May 13	7½	8%	Bombay, Ltd.	5⅞—6⅛	4⅛—5½	...
50,000	10	Feb. 26	16	10%	Bournemouth Gas and Water: 10 p.c.	29—30	8½—9	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	9—10	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8½—9	...
162,065	—	Dec. 30	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	...	64—66	...
992,045	Stk.	Feb. 12	14	30/-	Brentford A Consolid.	261—266	47—52	49½
734,920	,,	,,	11	26/3	Do. B New	204—209	45—50	46—47½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	70—75	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	63—65*	...
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	121—126	...
244,200	,,	,,	8	5⅓%	Do. A Ord. Stk.	154—159	80—85	80
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	April 14	12½	10%	British	44—45	24—26	...
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	59—61	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	47—50	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref.	4—6	5½—6½	...
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.*	70—75	58—63	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Feb. 26	5/9/4	33/4	Commercial 4 p.c. Stk.	106—108	51—56	...
560,000	,,	,,	5⅓	26/8	Do. 3½ p.c. do.	103—105	44—49	...
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47*	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	29½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	40
51,600	,,	Feb. 26	14½	10½%	Croydon A 10 p.c.	...	130—140	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	...	90—100	...
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	5½—6½	5½—6
16,298,975	Stk.	Feb. 12	4/17/4	30/-	Gas Light and Coke: 4 p.c. Ord.	98—102	52—55	52—54½
2,600,000	,,	,,	3½	26/8	Gas Light and Coke: 3½ p.c. max.	76—79	37—42	37—40
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	55—58	56¼—57½
4,674,850	,,	Dec. 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	45—48	46½
130,000	,,	,,	10	10%	Gas Light and Coke: 10 p.c. Bonds.	...	...	...
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	55—60	...
258,740	,,	,,	3½	2⅛%	Do. 3½ p.c.	87—89	38—43	...
70,000	10	May 13	11	7%	Hougkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Mar. 11	9	6⅛%	Hornsey 7 p.c.	...	88—93	...
131,000	,,	,,	7⅞	5⅛%	Ilford A and C	151—154	86—91	...
65,780	,,	,,	6⅜	4⅛%	Do. B	115—118	65—70	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	57—60	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	125—130	125—127
1,235,000	,,	Feb. 12	3½	3½%	Do. 3¼ p.c. Deb. Red.	84—86	80—85	...
235,242	,,	Mar. 26	6½	5⅛%	Lea Bridge Ord. 5 p.c.	119—121	80—85	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	A. 211—213; B. 146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Feb. 26	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4⅜	1¾—2¼	...
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—96	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11¼—12	70—75	...
1,875,892	,,	Feb. 26	4½	3⅛%	Newcastle & Gatsh'dCon.	98¼—99½	61½—62	...
529,705	,,	Dec. 30	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	52—54	53
15,000	10	Mar. 11	—	6⅛%	North Middlesex 10 p.c.	...	13—13½	...
55,940	10	,,	7/14/0	6⅛%	,, ,, 7 p.c.	14—15	7¼—8½	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd.	117—122	102—105	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	2½—2⅝	3—4	...
60,000	50	Mar. 11	13	7½%	Portsea Island, B	128—131	66—71	...
100,000	50	,,	12	6¾%	Do. C	118—121	53—58	...
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	⅛—1⅛	17/6
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅛—5	1½—2¼	...
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	69—75	70
600,000	Stk.	Jan. 29	4	4%	Do. ,, ,, 1911	...	47—50	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	47—50	...
150,000	10	Mar. 26	6	6/-	San Paulo 6 p.c. Pref.	10¼—11	7¼—7½	...
125,000	50	Dec. 30	5	5%	San Paulo 5 p.c. Deb.	47—49	39—41	...
135,000	Stk.	Mar. 11	10	50/-	Sheffield A	223—224	68—73	...
229,984	,,	,,	10	4⅛%	Do. B	222—224	58—63	...
523,500	,,	,,	10	35/5	Do. C	220—222	54—57	...
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Oct. 15	9	9%†	South African	10¼—11½	12—13	...
6,909,895	Stk.	Feb. 12	5/4/0	30/-	South Met. 4 p.c. Ord.	111—113	52—55	53—56½
250,000	,,	Jan. 15	—	5%	Do. Pref.	...	93—95	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72¼—74¼	45—48	47
224,820	,,	Feb. 26	3½	3%	South Shields Con. Stk.	157—159	99—101	100
1,087,795	,,	Aug. 14	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	64—69	...
247,558	,,	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	73—78	73
647,740	,,	May 13	7½	3⅛%	Southampton Ord.	99—102	57—60	...
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	...	61—63	...
120,000	,,	Aug. 14	—	3⅛%	Tottenham and District: A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	2⅛%	Tottenham and District: B 3½ p.c.	115—117	50—55	...
181,255	,,	June 10	4	4%	Tottenham and District: 4 p.c. Deb.	87—89	60—63*	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mar. 11	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	71—73	...
30,000	,,	Feb. 26	8½	55/-	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151—156	83—88	...
255,636	,,	,,	6½	40/-	Do. B 3½ p.c.	129—134	61—66	...
108,075	,,	,,	—	38/6	Do. C	...	61—66	...
140,865	,,	,,	—	38/6	New Ordinary	...	61—66	...
352,000	,,	,,	6½	33/9	Wimbledon 5 p.c.	117—122	60—65	...
98,000	,,	,,	6½	40/-	Epsom 5 p.c.	121—126	60—65	...
88,416	,,	Dec. 30	3	3%	3 p.c. Deb. Stk.	66—69	45—48	...

* Ex Div. † Next dividend will be at this rate.

Insurance against Unemployment.—This question was discussed at the annual meeting of the National Alliance of Employers and Employed at Birmingham, and it was strongly urged that the Alliance should take up this problem, and produce a scheme that would be satisfactory to both parties. As a result of the meeting, a Committee has been appointed, representing trade unions and employers. The Committee will meet at an early date to make investigations, set out a general questionnaire, and obtain such evidence as will bear upon this important subject.

Annual Statement at Droitwich.—At a meeting of the Droitwich Town Council last week, the Gas Manager (Mr. W. H. Wise) submitted his annual report on the undertaking. The chief items were summarized by the Chairman, who said there was a net profit on the year's working of £508, which showed that they had steered fairly well, in these very difficult times. Their liabilities on March 31 would show them to be about £1084 to the good; and this explained why they had not had to push up the price of gas so much as some towns. But they must run the undertaking on business lines; and there would have to be some increase in charges.

Gas-Workers' Wages at Hastings.—A statement of the bearing of the gas-workers' demands upon the Hastings and St. Leonards Gas Company has appeared in the local Press. In this it is pointed out that the granting of the demands would mean an addition of 3d. or 4d. per 1000 c.ft. to the price of gas. The local gas workers had their wages increased as lately as January last; and only last July the hours of working were reduced from twelve (nominal) to eight for shift workers, and from 56½ to 47 per week for time workers. The weekly wages bill is now £570, as against £267 in June, 1914, for a larger output of gas. Regular shift workers are granted annual holidays, and other workers get paid for bank holidays, Christmas day, &c.

Abortive Wages Conference.—The conference which took place last Tuesday evening between the representatives of the gas employers and employees terminated without any settlement being come to. A Press representative was informed by the employers' representatives that no statement could possibly be made by them. The men's representatives, on the other hand, announced that the meeting had proved abortive, and that no settlement had been arrived at. Instructions were subsequently given for the sending out of the necessary notices to cease work on June 26. At a mass meeting of gas workers at the East Ham Town Hall on Sunday morning, it was unanimously resolved: "That this meeting of gas workers, having heard a report of the negotiations from the union officials, hereby pledges itself to give every support in the forthcoming strike." Mr. Pickard, presiding, said that at 10 o'clock next Saturday night, unless the unforeseen happened, every man belonging to the National Union of Gas Workers and other similar unions in the gas industry would cease work. Machinery would be in force for a strike in every town.

Coke Supplies in Sheffield.—In view of the position with regard to the demands of the gas workers, the Sheffield Gas Company announced that (being compelled to conserve their supplies of fuel), as from last Friday morning, all supplies of coke for industrial purposes would be reduced 50 p.ct. Coke for domestic purposes will not be obtainable. Bakehouses and hospitals will be served, because of the importance of their needs. It is recognized that the step will cause much inconvenience; but, as the General Manager (Mr. Ralph Halkett) says, the Company cannot help themselves.

Nottingham Gas-Cooker Rents.—An increase is to be made, to take effect from the end of the present month, in the rentals of gas-cookers belonging to the Nottingham Corporation; the rates being advanced by 100 p.ct. This will affect about 10,000 consumers. The rents charged in Nottingham have been hitherto lower than in most of the other large towns; and the increase, it has been officially pointed out, has to be reckoned against a 227 p.ct. advance over pre-war prices in the cost of repairs and renewals. The present rates range from 1s. 6d. per quarter. Last year's revenue from the rental of stoves in Nottingham amounted to £4253.

Malta and Mediterranean Gas Company, Ltd.—The accounts for the year ended March 31, to be presented at the meeting to-day, show a profit for the twelve months of £12 220. After providing for interest, income-tax, &c., and the loss resulting from last year's working, there remains a sum of £1211 standing to the credit of the profit and loss account. The Directors propose to pay a dividend of 4 p.ct. (less tax) for the year on the first preference shares, leaving a balance of £11 to be carried forward. They regret to state that no money has yet been received from the Italian Government on account of the claim (£8193) made against them for the losses sustained in carrying on the works at Trapani and Marsala during the war.

The Vancouver Gas Company and the Victoria Gas Company (B.C.) have placed contracts for Glover-West vertical retort installations, together with the necessary equipment, and coal and coke handling machinery.

Councillor J. Beckett told the Church Council last week that the area of supply of the Accrington and District Gas Board is now 13,994 acres, or nearly 22 square miles. The total indebtedness of the undertaking is £282,290, and the income on revenue account £134,025.

A fire occurred on Monday of last week at the works near West Carnforth Station, co. Durham, belonging to Messrs. Dent & Co., tar distillers. There were grave fears that the naphtha tanks might burst; but fortunately the lids gave way, and only a series of small explosions took place. The damage is extensive, part of the plant being destroyed; but an estimate has not yet been made.

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Applications, with *copies* of recent Testimonials, should state the writer's Age, and if Married or Single, and should be addressed to H. J. IBBOTSON, care of The "GAS JOURNAL," 11, Bolt Court, FLEET STREET, E.C. 4.

COWES URBAN DISTRICT COUNCIL.

WANTED—Accountant-Secretary for the Gas Department, Cowes Urban District Council. Applicants are to state Salary required as Whole Time Official.
Applications are to be endorsed "Gas Secretary," and to be accompanied by Three recent Testimonials, and to reach me not later than noon on the 29th of June.
J. C. W. DAMANT,
Clerk to the Urban District Council.
Cowes.

ASSISTANT DISTRICT SUPERINTENDENT.

WANTED—a Tactful, Energetic, Commercial Man of Good Education and Address. He must have a thorough Practical Knowledge of the most Modern Methods of Gas Lighting, Cooking, Heating, &c., and must understand the Application and Use of Gas for Industrial and Power Purposes. He must be able to give Estimates and to Advise Consumers on all matters connected with Gas Supply, and must be Capable of Extending the use of Gas in face of Electrical Competition.
Applications, stating Age and giving full Details of Experience, but without Testimonials in the first instance, to be addressed to No. 6918, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

DISTRIBUTION Superintendent Wanted by Gas Undertaking in the West Midlands. Must be thoroughly conversant with all Modern Developments and able to Take Charge of the Department under the Control of the Manager. Salary, £300 per annum to commence.
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WANTED—Manager for Coke-Oven Plant at present consisting of Battery of 50 to 60 Waste-Heat Ovens, Ammonia, Tar, and Benzol Recovery, Benzol Rectification, and Tar Distillation. First-class Capabilities with Scientific Knowledge and Practical Experience requisite.
Apply, stating Age, Qualifications, Experience, and Salary required, to No. 6920, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

THE County Borough of Stockport (Gas Department) require the services of an energetic and capable CARBONIZING SUPERINTENDENT. Applicant should have had Practical Experience of Modern Coal and Carburetted Water Gas Plant, and be able to carry out the necessary Chemical Tests for the proper Regulation and Working of same.
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WANTED—Manager for Tar and Sulphate Plant.
Please Apply, stating Age, Experience, and Salary required, to No. 6921, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

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